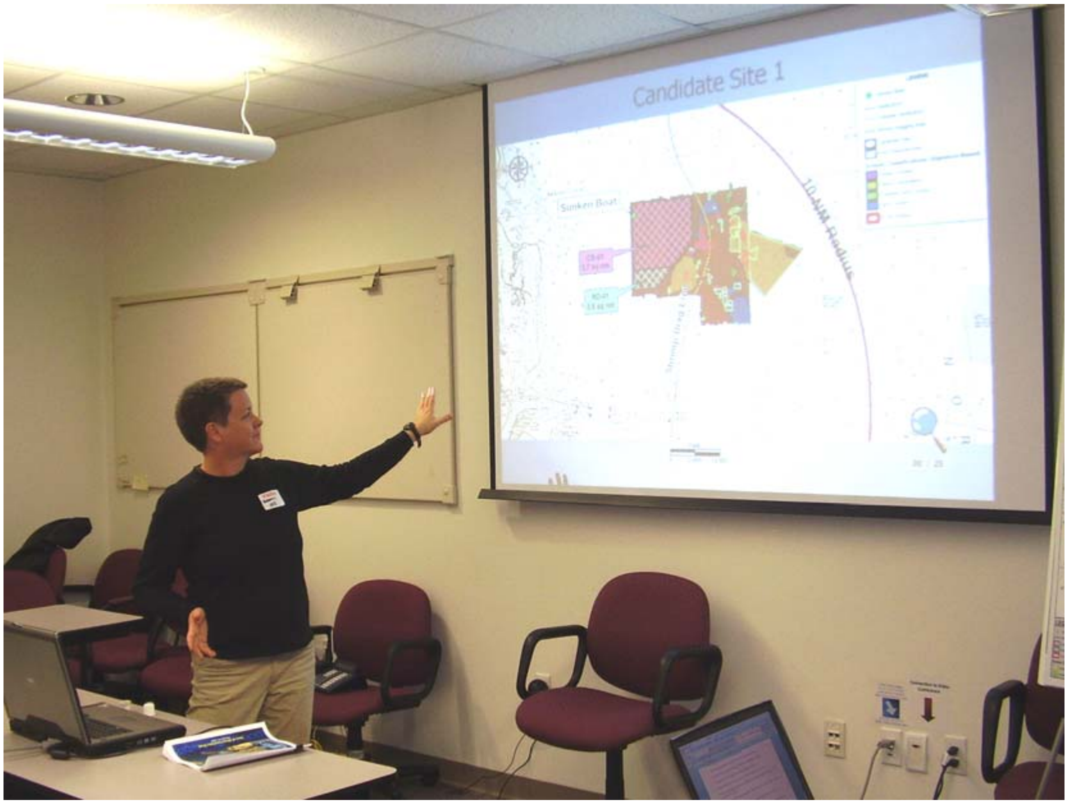
APPENDIX A

Public Participation and Agency Consultation



Draft Environmental Impact Statement
for
Designation of an Ocean Dredged Material Disposal Site Offshore of Jacksonville, Florida

EPA
United States
Environmental Protection
Agency

U.S. EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303

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Correspondence Index:
Public Participation and Agency Consultation

Number	Correspondence Type	Date	Description of Correspondence
1	NOI	July 9, 2010	Notice of Intent (NOI) in the Federal Register: Designation of an Ocean Dredged Material Disposal Site (ODMDS) Off the Mouth of the St. Johns River, FL
2	Scoping Letter	July 30, 2010	Eric P. Summa (USACE, Chief Environmental Branch) to Public/Agencies
3	Scoping Meeting Comment	August 18, 2010	Nancy Jones (Shrimp Boat Owner) to USACE/USEPA
4	Scoping Meeting Comment	August 18, 2010	Dot Mathias (President, North Jax Civic Association) to USACE/USEPA
5	Scoping Meeting Comment Matrix	August 18, 2010	Summary of comments made at the Scoping Meeting
6	Scoping Response Letter	September 13, 2010	Sally B. Mann (FDEP) to April N. Patterson (Planning Division, USACE)
7	Scoping Response Letter	October 19, 2010	Pace Wilber (NMFS) to Glenn Schuster (Planning Division, USACE) and Chris McArthur (Ocean Dumping Coordinator, USEPA)
8	Letter	November 24, 2010	Eric P. Summa (USACE, Chief Environmental Branch) to Scott Stroh (Director, Division of Historical Resources, SHPO)
9	Letter	January 5, 2011	Laura A. Kammerer (Deputy State Historic Preservation Officer) to Eric P. Summa (USACE, Chief Environmental Branch)
10	Letter	January 11, 2012	Laura A. Kammerer (Deputy State Historic Preservation Officer) to Eric P. Summa (USACE, Chief Environmental Branch)

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Federal Register: July 9, 2010 (Volume 75, Number 131)

DOCID: fr09jy10-31 FR Doc 2010-16773

ENVIRONMENTAL PROTECTION AGENCY

Environmental Protection Agency

ER ID: [ER-FRL-8991-4]

NOTICE: NOTICES

DOCID: fr09jy10-31

ACTION: Agency Information Collection Activities; Proposals, Submissions, and Approvals:

DOCUMENT ACTION: Notice of Intent to prepare an Environmental Impact Statement (EIS) for the designation of an ODMDS off the mouth of the St. Johns River, Florida.

SUBJECT CATEGORY:

Notice of Intent: Designation of an Ocean Dredged Material Disposal Site (ODMDS) Off the Mouth of the St. Johns River, FL

DOCUMENT SUMMARY:

EPA in cooperation with the U.S. Army Corps of Engineers Jacksonville District (USACE) intends to prepare an EIS to designate a new ODMDS offshore the mouth of the St. Johns River. The EIS will provide the information necessary to evaluate the potential environmental impacts associated with ODMDS alternatives and identify a preferred alternative that meets EPA's site selection criteria at 40 CFR 228.5 and 228.6.

Need for Action: The USACE has requested that EPA designate an additional ODMDS, 4 square nautical miles in size, offshore the mouth of the St. Johns River for the disposal of dredged material from the Jacksonville Harbor Federal Navigation Project and from Naval Station Mayport. The need for an additional ODMDS is based on observed mounding at the existing Jacksonville ODMDS, capacity computer modeling results, and estimates of future proposed projects.

Alternatives: The following proposed alternatives have been tentatively defined.

1. No action. The no action alternative is defined as not designating an additional ocean disposal site. The existing Jacksonville ODMDS would reach capacity in 8 to 10 years.

2. Expansion of the existing Jacksonville ODMDS. Expand the existing Jacksonville ODMDS to the south and east.

3. South Alternative ODMDS. Designate an ODMDS 5.8 to 8.6 nautical miles southeast of St. Johns River entrance.

4. North Alternative ODMDS. Designate an ODMDS 4.1 to 7.1 nautical miles northeast of St. Johns River entrance.

Scoping: EPA is requesting written comments from federal, state, and local governments, industry, nongovernmental organizations, and the general public on the range of alternatives considered, specific

environmental issues to be evaluated in the EIS, and the potential impacts of the alternatives for an ODMDS designated offshore the mouth of the St. Johns River. Scoping comments will be accepted for 60 days, beginning with the date of this Notice. A public scoping meeting will be held in the Jacksonville, Florida area in August of 2010.

Estimated Date of Draft EIS Release: September 2011.

Responsible Official: A. Stanley Meiburg, Acting Regional Administrator, Region 4.

Dated: July 1, 2010.
Susan E. Bromm,
Director, Office of Federal Activities.
[FR Doc. 201016773 Filed 7810; 8:45 am]
BILLING CODE P

SUMMARY:

Designation of an Ocean Dredged Material Disposal Site (ODMDS): off the Mouth of the St. Johns River, FL

DOCUMENT BODY:

Purpose: EPA has the authority to designate ODMDSs under Section 102 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1401 et seq.). It is EPA's policy to prepare a voluntary National Environmental Policy document for all ODMDS designations (63 FR 58045, October 1998).

For Further Information, to Submit Comments, and to be Placed On the Project Mailing List Contact: Mr. Christopher McArthur, U.S. Environmental Protection Agency, Region 4, 61 Forsyth Street, Atlanta, Georgia 30303, phone 4045629391, email: mcarthur.christopher@epa.gov.

#2

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

JUL 30 2010

Dear Sir or Madam:

The US Army Corps of Engineers (Corps), Jacksonville District, and the US Environmental Protection Agency, Region 4 (EPA), are selecting a location for a new or expanded Jacksonville Ocean Dredged Material Disposal Site (ODMDS) in the Atlantic Ocean offshore of the mouth of the St. Johns River. The existing Jacksonville ODMDS has been in use since 1952 and was officially designated in 1983. Based on capacity modeling, site bathymetry, and anticipated levels of use, the capacity of the existing Jacksonville ODMDS will be reached in 3 to 8 years. As a result, Corps has determined the need for either designation of a new ODMDS or a modification to the existing ODMDS. Continued use of the ODMDS is needed to meet future requirements for ocean disposal of dredged material from routine maintenance of Naval Station Mayport and the Federal Channel in combination with potential new construction depths of Jacksonville Harbor and Naval Station Mayport.

Corps and EPA are conducting applicable studies and are preparing an Environmental Impact Statement (EIS) to provide the information necessary to evaluate alternatives and designate the future Jacksonville ODMDS pursuant to Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972, as amended.

At this time, we are inviting agencies, interest groups, and the public to provide input on an array of alternatives and to identify significant resource concerns with the candidate sites. Please find the enclosed information package which briefly describes the site alternatives. Your comments will be incorporated during the preparation of the EIS, used as vital insight into the new or expanded Jacksonville ODMDS designation, and retained for assistance in shaping the scope of future studies.

Please provide written comments within 45 days from the date of this letter.

EPA and Corps will hold two scoping meetings to offer further opportunity for input. Please join us at either meeting time:

2-4 PM or 6-8 PM
Wednesday, August 18, 2010
Jacksonville Port Authority
2831 Talleyrand Avenue
Jacksonville, Florida 32206

Comments should be addressed to the Corps or EPA at the following:

U.S. Army Corps of Engineers
Jacksonville District
Attention: Ms. April Patterson (CESAJ-PD-EC)
Post Office Box 4970
Jacksonville, FL 32232-0019

U.S. Environmental Protection Agency
Region 4
(ATTN: Mr. Chris McArthur, Ocean Dumping Program Coordinator, Wetlands & Marine Regulatory Section)
61 Forsyth Street
Atlanta, Georgia 30303

If you have any questions concerning this meeting, please call Ms. Patterson, with the Corps, at (904) 232-2610.

Sincerely,

Eric P. Summa
Chief, Environmental Branch

Enclosure

JACKSONVILLE OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS) INFORMATION PACKAGE

INTRODUCTION: The disposal of dredged sediments from navigation channels and harbors onto the ocean floor can only be authorized at sites designated for that purpose. The US Army Corps of Engineers, Jacksonville District (USACE), and the US Environmental Protection Agency, Region 4 (EPA), share the statutory responsibility for selection and management of these sites. The sites must be located and managed to ensure that ocean disposal of dredged material will not unreasonably degrade the marine environment or endanger human health, welfare, amenities, or economic potentialities. This information package summarizes some of the known issues associated with locating a new site offshore of the mouth of the St. Johns River, and provides some insight into the detailed analysis that is used to determine where that site should be located.

EXISTING SITE: The existing Jacksonville Ocean Dredged Material Disposal Site (ODMDS) is located in an area of the continental shelf off the east coast of Florida approximately 5 nautical miles (nm) southeast of the mouth of the St. Johns River. It is currently 1 nm by 1 nm (1 nm^2) in size with an average depth of 14 meters (46 feet).

NEED FOR INCREASED ODMDS CAPACITY: EPA and USACE have determined that the existing Jacksonville ODMDS has a remaining capacity for 2 million cubic yards (mcy) of dredge material for the proposed deepening of Naval Station (NS) Mayport and 8 years of continued maintenance of NS Mayport and the St. Johns River. Based on potential increases in maintenance volumes and potential deepening of Jacksonville Harbor, currently under study, USACE has determined that the existing Jacksonville ODMDS may reach capacity as early as 2013. EPA and USACE are therefore initiating the process for either expanding the existing Jacksonville ODMDS or designating a new ODMDS offshore Jacksonville, Florida.

SITE AREA ALTERNATIVES: Two separate areas were surveyed and three site alternatives are being reviewed.

The northern area (North Area) is roughly 13.6 square nautical miles (nm^2), the center of which lies approximately 7 nautical miles (nm) northeast of the mouth of the St. John's River. The minimum distance to the 3-nm line is approximately 0.3 nm to the west. Several designated ship mooring areas are just to the southwest of the area. There is an artificial reef approximately 1.7 nm to the east and another immediately to the south. A USACE rock placement site abuts the North Area to the east and south.

The southern area (South Area) shares a boundary with the western and southern boundaries of the existing ODMDS. It is approximately 8.5 nm^2, excluding a partially-surveyed area south of a submarine cable that bisects the site from west to east and which was ruled out for further study during the survey. The South Area's center lies 6.6 nm southeast of the mouth of the St. John's River. The minimum distance to the 3-nm line is approximately 0.2 nm to the west. An artificial reef is approximately 2 nm to the southeast.

PLAN OF ACTION: USACE and EPA are proposing to designate a new ODMDS location in the Atlantic Ocean off the mouth of the St. Johns River. There are three possible site locations, and one no action option: 1 location identified as the North Area, another location adjacent to the existing site identified as the South Area, and the last location south of, but not adjoining the existing ODMDS site in the South Area. In the no action alternative, material would be sent to the Fernandina Beach ODMDS. The goal of the site selection process is to select a location which minimizes the risk of harm to the marine environment and human health and facilitates the necessary dredging and subsequent placement of dredged material. The site must meet selection criteria specified in EPA's Ocean Dumping Regulations. The preparation of an Environmental Impact Statement (EIS) is an integral part of the site designation process. The EIS will present information to evaluate the suitability of potential sites and disposal alternatives. It will be based on available information as well as new material developed specifically for this site designation and will succinctly document the consideration made in locating the ODMDS at a specific location.

We are requesting comments and information from agencies, interest groups, and the public to identify significant resources and issues of concern. The USACE and EPA will hold public meetings this spring to follow up with the comments received and to give further opportunity for input. Following the gathering of public comments, we will complete our information gathering plan, collect the required data, and prepare the EIS and decision making documents. The public will have the opportunity to review the draft and final EIS, and make additional comments on the proposed designation.

The following three candidate sites are contained within the surveyed areas: "Alternative 3" is located in the North Area, and "Alternative 1" and "Alternative 2" are located in the South Area near the existing Jacksonville ODMDS.

ISSUES: EPA's Ocean Dumping Regulations contain environmental factors which must be considered in locating a dredged material disposal site in the ocean. As discussed previously, the goal is to position the site away from marine environments that are incompatible with use. Initial discussions with agencies, interest groups, and our surveys indicate that the following issues will likely be significant.

Shrimping: Members of the shrimp industry and the US Fish and Wildlife Service have been consulted and care has been taken to avoid shrimping areas to the extent practicable.

North Atlantic Right Whale: North Atlantic Right Whale calving and corridor areas are located in the North Area where "Alternative 3" and the Fernandina Beach ODMDS are also located. The North Atlantic Right Whale is protected under the Endangered Species and Marine Mammal Protection Acts.

Hard Bottoms: Side scan sonar surveys were conducted in October 2009 and March 2010 for both the north and south areas to identify potential hard bottom areas. Potential hard bottom areas have been considered in selecting the alternative sites to avoid overlap with potential benthic communities and essential fish habitat.

ECONOMIC ANALYSIS: The designated ODMDS is required by USACE policies and procedures to be located at an optimal distance from the dredging activity such that the socioeconomic analysis of benefits outweighs the costs. The economic analysis takes into account several different dredging scenarios over a 50-year project life horizon and compares the benefits and the costs of the dredging activities within that scenario. The different dredging scenarios considered include: a one-time new construction cost which would involve a deepening and widening of the Federal Channel, a one-time new construction cost in addition to routine maintenance and dredging of shoaled material, and lastly, routine maintenance only cost scenario for the 50-year project life. For each of these three different dredging scenarios, the siting of the ODMDS is evaluated at incremental distances offshore (5 miles, 10 miles, and 15 miles). Increasing the distance of the ODMDS site from the dredging activity increases the cost of disposal. For that reason, the goal is to determine the optimal radial distance offshore for a 50-year horizon of a variety of potential uses. At this time, the ODMDS siting appears economically justified for not more than 5 miles offshore for one of the scenarios and not more than 10 miles offshore for two of the scenarios.

SITE CONFIGURATION: The size, shape, and location of the site should facilitate the intended use and reduce the risk of user errors. The site configuration should allow management options such as placing materials from specific dredging locations in specific locations of the site. The site should be large enough to accommodate the anticipated quantities and types of dredged materials. Preliminary estimates indicate a 4 square nautical mile site would be required for a 50-year analysis period based on current maintenance and authorized channel improvements.

SCHEDULE:

Publish Notice of Intent to Prepare EIS	July 2010
Mail Scoping Letter	July 2010
Hold Public Meetings	August 2010
Collect Site Specific Data	September 2010-September 2011
Publish Draft EIS	September 2011
Publish Final EIS	June 2012
Designate Site (Rulemaking)	November 2012

MAILING LIST

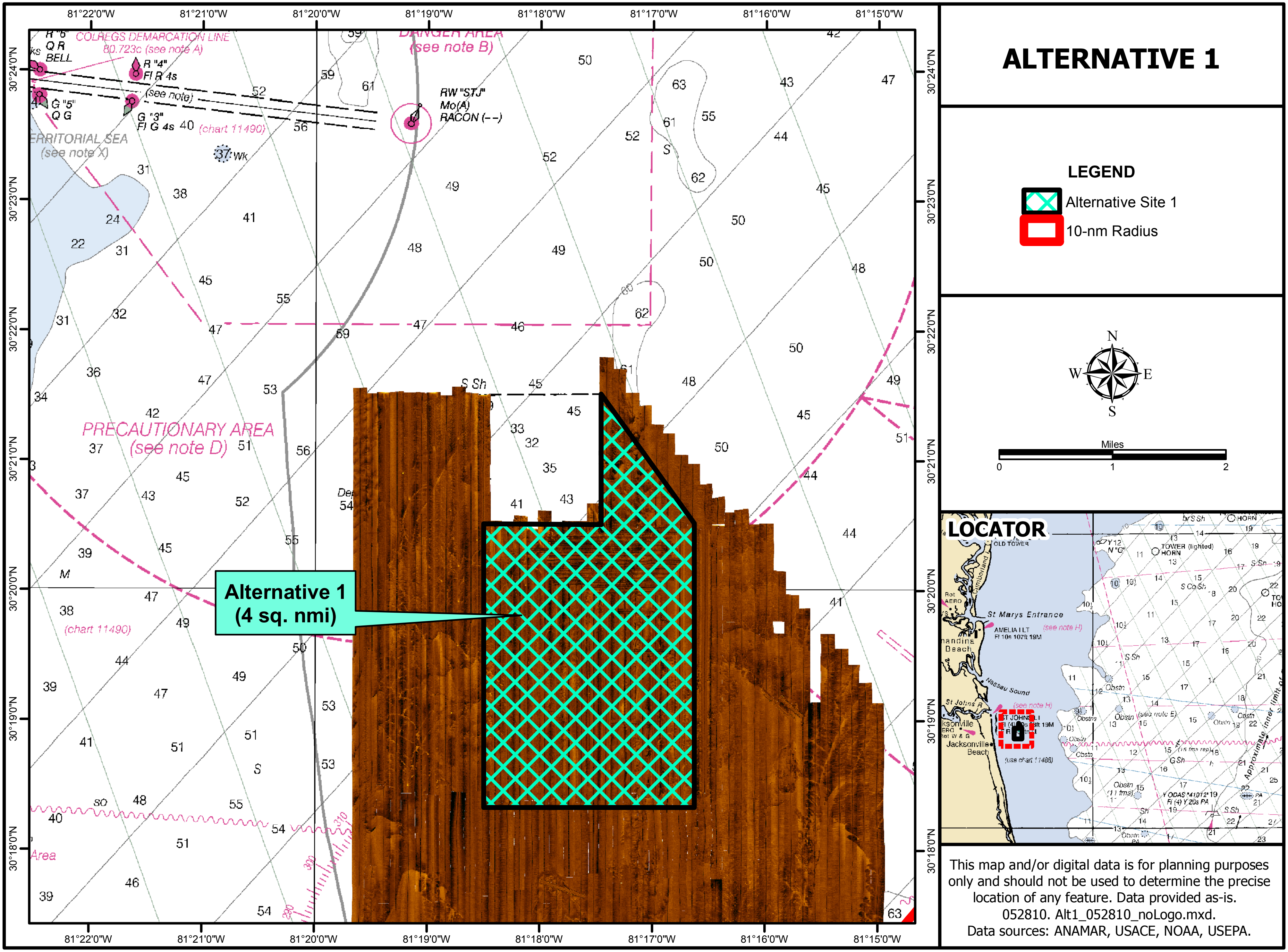
Federal Agencies
U.S. Environmental Protection Agency, Region 4, Wetlands & Marine Regulatory Section
U.S. Army Corps of Engineers, Jacksonville District
U.S. Fish and Wildlife Service
National Oceanic and Atmospheric Administration (NOAA) – National Marine Fisheries Service
Naval Facilities Engineering Command (NAVFAC)
Seventh Coast Guard District
NOAA-National Ocean Service-Office of Coast Survey
Minerals Management Service
Naval Station Mayport
US Marine Corps-Blount Island

State Agencies and Officials
Florida Department of Environmental Protection, Office of Intergovernmental Programs
Florida Department of Environmental Protection, Bureau of Beaches and Coastal Systems
Florida Fish and Wildlife Conservation Commission

Honorable Bill Nelson, US Senate
Honorable George Lemieux, US Senate
Honorable Corrine Brown, US Congress
Honorable Ander Crenshaw, US Congress
Honorable Cliff Stearns, US Congress

Mayor, City of Jacksonville

Local Agencies, Businesses, and Organizations
AT&T Undersea Systems
Charter Boast, Inc.
City of Jacksonville, Environmental Quality Division
City of Jacksonville, Artificial Reef Program
Atlantic Pro Divers
Charter Hunt
Greater Jacksonville Kingfish Tournament
Jacksonville Port Authority
Jacksonville Offshore Sport Fishing Club
Jacksonville University
Ocean Conservancy
Organized Fishermen of Florida
Safe Harbor Wholesale
Scubanauts
St. Johns Bar Pilots Assoc.
St. Johns Riverkeeper
Stricklands



ALTERNATIVE 1
LEGEND
Alternative Site 1
10-nm Radius
N
S
E
W
Miles
0
1
2
LOCATOR
Alternative 1
(4 sq. nmi)
PRECAUTIONARY AREA
(see note D)
COLREGS DEMARCATION LINE
DANGER AREA
(see note B)
RW "STJ"
Mo(A)
RACON (--)
(chart 11490)
This map and/or digital data is for planning purposes only and should not be used to determine the precise location of any feature. Data provided as-is.
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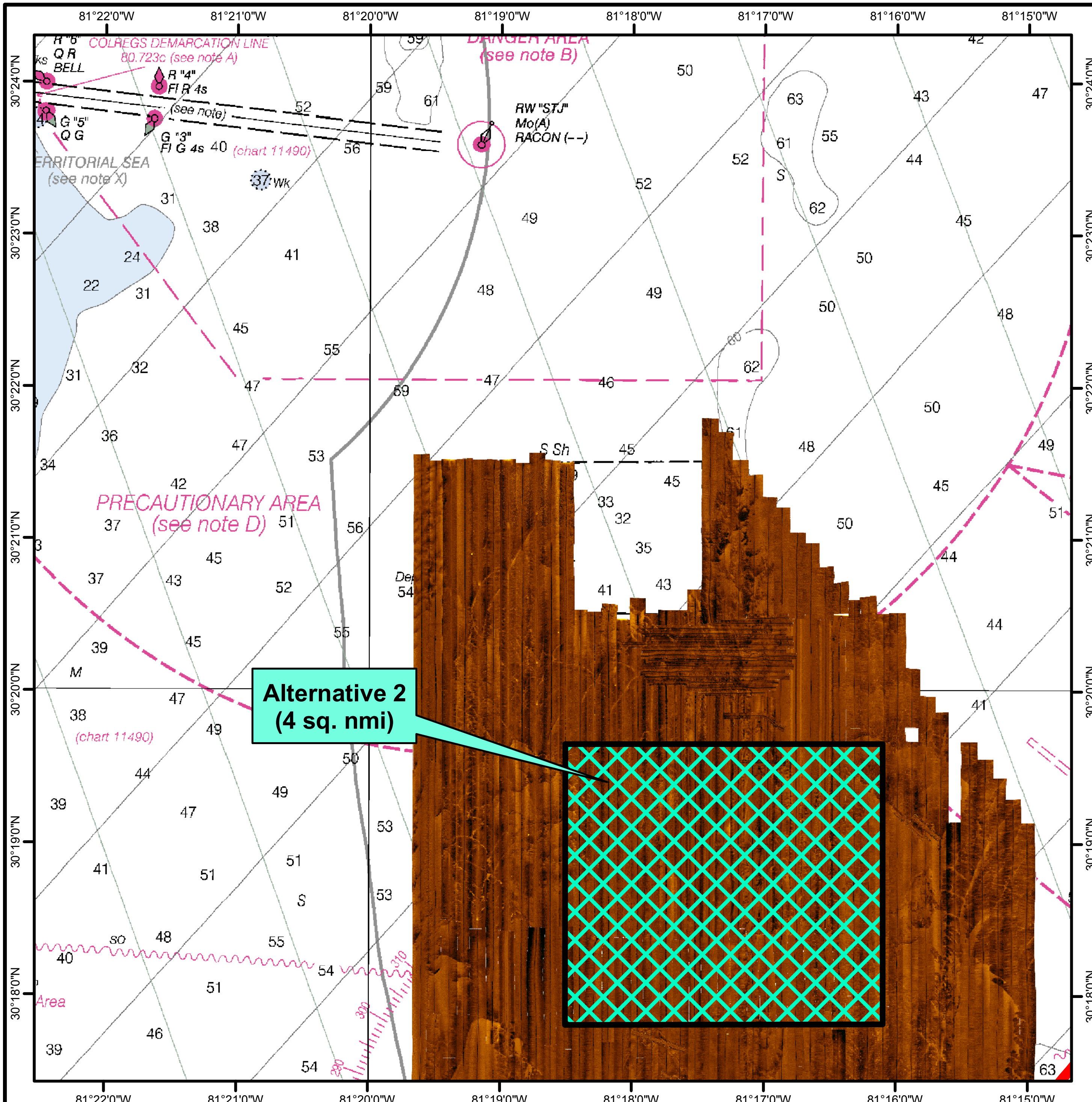
Data sources: ANAMAR, USACE, NOAA, USEPA.



ALTERNATIVE 2

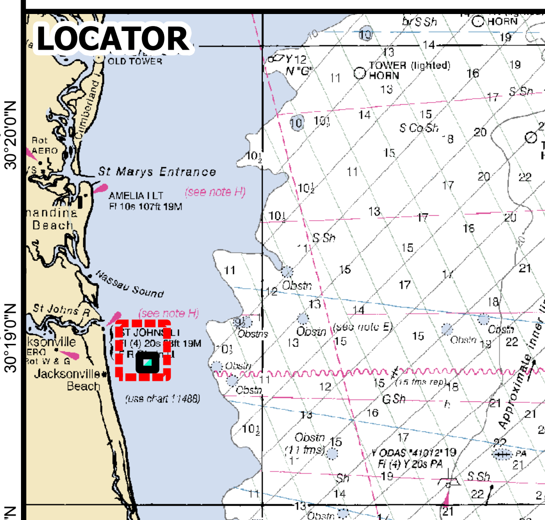
LEGEND

- Alternative Site 2
- 10-nm Radius

N E S W

Miles

0 1 2



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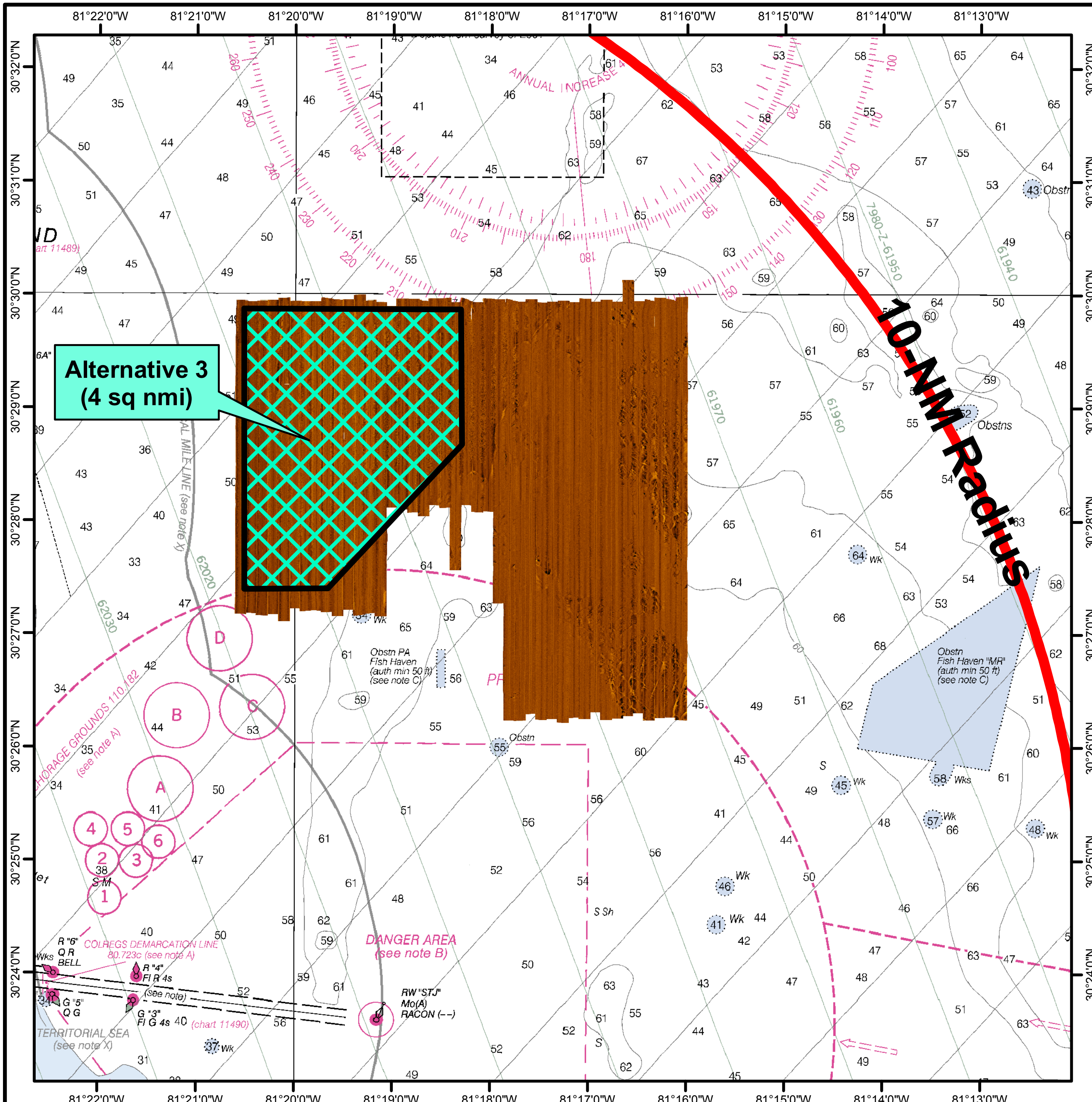
Data sources: ANAMAR, USACE, NOAA, USEPA.

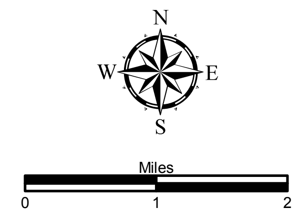


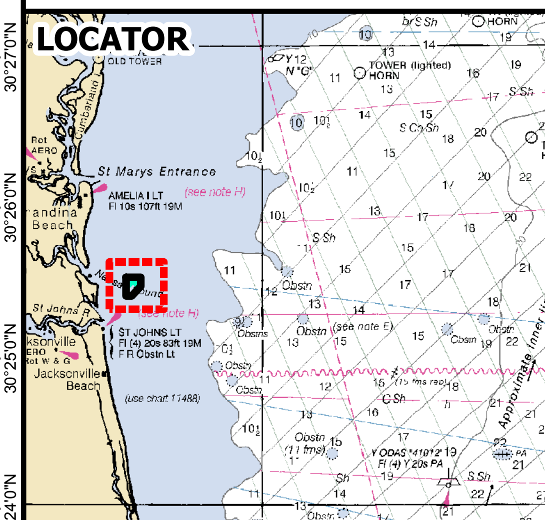
ALTERNATIVE 3

LEGEND

Alternative 3

10-nm Radius





This map and/or digital data is for planning purposes only and should not be used to determine the precise location of any feature. Data provided as-is.
052810. Alt3_052810_noLogo.mxd
Data sources: ANAMAR, USACE, NOAA.

US Army Corps of Engineers. Jacksonville District

Comments/ Questions

See Privacy Act Statement on reverse side

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SUBJECT/EVENT: **Jacksonville ODMDS**

DATE: 8-18-10

COMMENTS/QUESTIONS

As a shrimper and representing the local shrimpers of Mayport, we would prefer Site 1 or even 2. Site 3 entails and area that we fish 9-10 months of the year. While Sites 1 + 2 are covering another area that we fish, we only fish it 2 months of the year. (If that much)
The Northern part of 1 already has debris and is not fishable.

Nancy Jones Shrimpboat Owner Shrimp Producers
NAME AND TITLE (PLEASE PRINT)

12656 Meadowsweet Ln
MAILING ADDRESS

Jacksonville | FL | 32225
CITY | STATE | ZIP CODE

904-219-1028
PHONE NUMBER

diveindude@comcast.net
EMAIL ADDRESS

#3

REPRESENTING (Check one)

___ ELECTED OFFICIAL
___ TRIBAL
___ CONGRESSIONAL
___ FEDERAL AGENCY
___ STATE LEGISLATURE
___ STATE AGENCY
___ LOCAL GOVERNMENT
___ ENVIRONMENTAL
___ AGRICULTURE
X GROUP Shrimp Producers
___ SELF
___ MEDIA
___ OTHER

Do you wish to have your name included on the mailing list for future information?
___ YES ___ NO

Comments may also be mailed to:
US ARMY CORPS OF ENGINEERS
PO Box 4970, Jacksonville, FL 32232-0019
ATTN: Ms. April Patterson (CESAJ-PD-EC)

THIS INFORMATION IS RELEASABLE UNDER THE FREEDOM OF INFORMATION ACT.

CESAD FORM 935, OCT 98

PRIVACY ACT STATEMENT

AUTHORITY: 42 USC 4321, 4331-4335

PRINCIPAL PURPOSES: Information on this card is used for organization and conduct of this meeting. It may be added to the mailing list for notification of future meetings on the topic and for addressing correspondence subsequent to the meeting.

ROUTINE USES: This information is a public record and may be disclosed to other Federal or local agencies for governmental purposes as well as to private individuals and organizations under the Freedom of Information Act.

MANDATORY OR VOLUNTARY DISCLOSURE: Completion of this card is voluntary. However, failure to supply the information requested may result in your (or your agency's) omission from further notification regarding participation in the process.

CESAD FORM 935, OCT 98

#4

US Army Corps of Engineers.
Jacksonville District

Comments/ Questions

See Privacy Act Statement on reverse side

SUBJECT/EVENT: **Jacksonville ODMDS**

DATE: 8-18-10

COMMENTS/QUESTIONS

Include for public coordination of GRR 2

Dot Mathias, President North Jax Civic Assn
NAME AND TITLE (PLEASE PRINT)

341 Boisden Rd.
MAILING ADDRESS

Jacksonville, Fl. 32218
CITY STATE ZIP CODE

757-4949-H. - 858-1946 wk.
PHONE NUMBER

—
EMAIL ADDRESS

Comments Received During Scoping Meeting Held August 18, 2010			#5
Name	**Comment Number**	**Comment/Question**	**Comment Type**
Nancy Jones - Shrimp boat owner/Shrimp Producers Association	1	As a shrimper and representing the local shrimpers of Mayport, we would prefer Site 1 or even 2. Site 3 entails an area that we fish 9-10 months of the year. While Sites 1 and 2 are covering another area that we fish, we only fish it 2 months of the year (if that much). The northern part of Site 1 already has debris and is not fishable.	Written Comment
Dot Mathias - President of the North Jax Civic Association	2	Include for public coordination of the GRR2.	Written Comment
Sue Wilcox - Jax Reef Research Team	3	Sue Wilcox representing the Jacksonville Reef Research Team came to learn more about the Alternative Sites proposed for the new Jacksonville ODMDS location. Sue Wilcox expressed concerns about the existing Fernandina Beach ODMDS where she says there is livebottom. Chris McArthur, USEPA, Ocean Dumping Coordinator, responded that he would investigate further. Sue Wilcox did not provide written comments or coordinates regarding her findings.	Verbal Comment
Neil Armingeon - St. Johns Riverkeeper	4	He is concerned about the deepening of Jacksonville Harbor and the resulting saltwater intrusion. USACE and EPA representatives stated that a new Jacksonville ODMDS will be needed regardless of whether the deepening occurs for both maintenance of the federal channel and Naval Station Mayport dredged material.	Verbal Comment
Janie Thomas - Shrimp Producers Association	5	The shrimpers commented that they were against the deepening of the St Johns River. Shrimp Producers Assoc. representative, Janie Thomas, said that they worry shrimp will move further into the river as a result of the deepening and potential changes in river water salinity. Nancy Jones, Shrimp Producers Association, provided hard copies of shrimp trawl data maps.	Verbal Comment
Ed Kalakauskis - TISIRI	6	Requested coordinates for the dumpsters and sunken boat identified during the sidescan sonar surveys. Laurel Reichold, USACE Jacksonville District PD-PN said the containers are now mapped on the NOAA charts just south of the existing Jacksonville ODMDS and are labeled as an “obstruction.” April Patterson, USACE, Jacksonville District, PD-EC, left a message with Mr. Kalakauskis relaying the above information on Wednesday, September 1, 2010.	Verbal Comment

#6

Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

September 13, 2010

Ms. April N. Patterson
Planning Division, Jacksonville District
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

RE: Environmental Protection Agency and U.S. Army Corps of Engineers – Scoping Notice – New or Expanded Jacksonville Ocean Dredged Material Disposal Site (ODMDS) – Offshore Duval County, Florida.
SAI # FL201008045383C

Dear Ms. Patterson:

The Florida State Clearinghouse has coordinated a review of the subject scoping notice under the following authorities: Presidential Executive Order 12372; Section 403.061(40), *Florida Statutes*; the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended; and the National Environmental Policy Act, 42 U.S.C. §§ 4321-4347, as amended.

Based on the information contained in the public notice and the comments provided by our reviewing agencies, at this stage, the state has no objections to the proposed federal action. To ensure the project's consistency with the Florida Coastal Management Program, concerns identified by the state during the on-going interagency coordination meetings and subsequent reviews must be addressed prior to project implementation.

Thank you for the opportunity to review the proposal. Should you have any questions regarding this letter, please contact Ms. Lauren P. Milligan at (850) 245-2170.

Yours sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm
Enclosures

Project Information	
Project:	FL201008045383C
Comments Due:	09/06/2010
Letter Due:	09/17/2010
Description:	ENVIRONMENTAL PROTECTION AGENCY AND U.S. ARMY CORPS OF ENGINEERS - SCOPING NOTICE - NEW OR EXPANDED JACKSONVILLE OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS) - OFFSHORE DUVAL COUNTY, FLORIDA.
Keywords:	EPA/ACOE - NEW/EXPANDED JACKSONVILLE OCEAN DREDGED MATERIAL DISPOSAL SITE
CFDA #:	66.999

Agency Comments:

FISH and WILDLIFE COMMISSION - FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

NO COMMENT BY LISA GREGG ON 8/9/10.

STATE - FLORIDA DEPARTMENT OF STATE

No Comments/Consistent

ENVIRONMENTAL PROTECTION - FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DEP's Outer Continental Shelf Program staff are continuing to coordinate with the EPA and USACE to review the proposed ODMDS alternatives and proposed effects on Florida's coastal resources.

For more information or to submit comments, please contact the Clearinghouse Office at:

3900 COMMONWEALTH BOULEVARD, M.S. 47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

Visit the Clearinghouse Home Page to query other projects.

COUNTY: DUVAL

2010-3762
SCH-106-EPA-CORPS

DATE: 8/2/2010
COMMENTS DUE DATE: 9/6/2010
CLEARANCE DUE DATE: 9/17/2010
SAI#: FL201008045383C

MESSAGE:

STATE AGENCIES	WATER MNGMNT. DISTRICTS	OPB POLICY UNIT	RPCS & LOC GOVS
ENVIRONMENTAL PROTECTION			
FISH and WILDLIFE COMMISSION			
X STATE			

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

_ **Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.**

X **Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.**

_ **Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.**

_ **Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.**

Project Description:

ENVIRONMENTAL PROTECTION AGENCY AND U.S. ARMY CORPS OF ENGINEERS - SCOPING NOTICE - NEW OR EXPANDED JACKSONVILLE OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS) - OFFSHORE DUVAL COUNTY, FLORIDA.

To: Florida State Clearinghouse

AGENCY CONTACT AND COORDINATOR (SCH)
3900 COMMONWEALTH BOULEVARD MS-47
TALLAHASSEE, FLORIDA 32399-3000
TELEPHONE: (850) 245-2161
FAX: (850) 245-2190

EO. 12372/NEPA

- [x] No Comment
- [ ] Comment Attached
- [ ] Not Applicable

Federal Consistency

- [x] No Comment/Consistent
- [ ] Consistent/Comments Attached
- [ ] Inconsistent/Comments Attached
- [ ] Not Applicable

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BUREAU OF
HISTORIC PRESERVATION
2010 AUG -6 A 11:20

From:

Division/Bureau: Division of Historical Resources
Bureau of Historic Preservation

Reviewer: Katie Peterson

Date: 8/17/10

RECEIVED
AUG 2 0 2010
DEP Office of
Intergovt'l Programs

#7

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
(727) 824-5317; FAX (727) 824-5300
http://sero.nmfs.noaa.gov/

October 19, 2010 F/SER4:GG/pw

Glenn Schuster
Jacksonville District
Department of the Army Corps of Engineers
PO Box 4970
Jacksonville, Florida 32232

Christopher McArthur
Coastal Programs Section
U.S. Environmental Protection Agency
61 Forsyth Street, SW
Atlanta, Georgia 30303

Dear Mr. Schuster and Mr. McArthur:

NOAA's National Marine Fisheries Service (NMFS) received your letter dated July 30, 2010, requesting preliminary comments on the candidate sites for the Jacksonville Ocean Dredged Material Disposal Site (JAX ODMDS). The US Army Corps of Engineers (Corps), Jacksonville District, and the US Environmental Protection Agency, Region 4 (EPA), are preparing an Environmental Impact Statement to evaluate alternatives and designate the future JAX ODMDS pursuant to Section 102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972, as amended. The selected site must meet criteria specified in EPA's Ocean Dumping Regulations. The comments below are from our Habitat Conservation Division. Any comments offered by our Protected Resources Division would be transmitted separately.

Current Conditions
The existing JAX ODMDS is in the Atlantic Ocean offshore of the mouth of the St. Johns River and has been used since 1952; official designation occurred in 1983. Based on capacity modeling, site bathymetry, and anticipated levels of use, the site's capacity will be reached in 3 to 8 years. Expansion or a new site is needed based on the projected requirements from routine maintenance and expansion of Naval Station Mayport, the planned new construction depths for Jacksonville Harbor (St. Johns River Inlet Jetty terminus to mile #13 Blount Island terminals), and routine maintenance of the federal navigation channels in the Port of Jacksonville.

Three candidate locations in two areas have been identified. Alternative site 3 is located within the North Area, which is roughly 13.6 square nautical miles, the center of which lies approximately 7 nautical miles northeast of the mouth of the St. John's River, and is approximately 0.3 nautical miles from state waters. There is an artificial reef approximately 1.7 nautical miles to the east, another reef immediately to the south, and the Corps' rock placement site forms the eastern and southern boundaries of this candidate site.

Alternatives 1 and Alternative 2 occur within the South Area, which shares a boundary with the western and southern boundaries of the existing JAX ODMDS. The South Area is approximately 8.5 square nautical miles, and its center is 6.6 nautical miles southeastward of the mouth of the St. John's River, and 0.2 nautical miles the west of state waters. There is an artificial reef approximately 2 nautical miles to the southeast.

Consultation History
NMFS attended an interagency meeting on February 11, 2010, and participated in two teleconferences (March 3 and March 24, 2010) with the Corps, EPA, NOAA Protected Resource Division, Florida Fish and Wildlife Conservation Commission, and Florida Department of Environmental Protection. A variety of topics were discussed, including results from biological surveys and sidescan surveys, as well as the methodologies and timing of future surveys. These meetings were followed by a public scoping meeting August 18, 2010, at the Jacksonville Port Authority where concerns over disruption to shrimp trawling and recreational fishing were discussed.

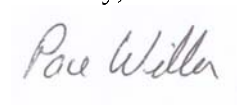
Resource Concerns
Areas that would be affected by the proposed project provide habitat for species of ecological, commercial, or recreational importance. The South Atlantic Fishery Management Council (SAFMC) designates habitats within the project area as essential fish habitat (EFH), including hardbottom areas and shoal complexes. Federally or state managed fishery species associated with these habitats include red drum (*Sciaenops ocellatus*), Spanish mackerel (*Scomberomorus maculatus*), juvenile gag grouper (*Mycteroperca microlepis*), black sea bass (*Centropristis striata*), sheepshead (*Archosargus probatocephalus*), white shrimp (*Litopenaeus setiferus*), brown shrimp (*Farfantepenaeus aztecus*), spiny lobster (*Panulirus argus*), bonnethead shark (*Sphyrna tiburo*), Atlantic sharpnose shark (*Rhizoprionodon terraenovae*), bluefish (*Pomatomus saltatrix*), cobia (*Rachycentron canadum*), and summer flounder (*Paralichthys dentatus*). Shoal complexes and hard bottom are designated as Habitat Areas of Particular Concern (HAPC) for penaeid shrimp. HAPC's are a subset of EFH that is either rare, particularly susceptible to human-induced degradation, especially important ecologically, or located in an environmentally stressed area. Shrimp, lobster, Spanish mackerel, sheepshead, cobia, black sea bass, and gag grouper are managed by SAFMC. The Mid-Atlantic Fishery Management Council (MAFMC) manages bluefish and summer flounder, and NMFS manages sharks. SAFMC provides detailed information on the EFH requirements of the species it manages in a comprehensive amendment to the fishery management plans prepared in 1998; MAFMC provides details about the EFH requirements of species it manages in separate amendments to individual fishery management plans.

General comments
The EIS should provide an EFH assessment that includes a description of the proposed action; an analysis of the effects (including cumulative effects) of the proposed action on EFH and managed species; the federal agency's views regarding the effects of the action on EFH; and proposed mitigation, if applicable. The EIS should fully consider how impacts to the benthic communities, even temporarily, might affect secondary production in commercial and recreational fisheries. In addition, sidescan sonar surveys conducted during October 2009 and March 2010 and subsequent groundtruthing identified hardbottom ridges, soft corals and sponge patches in and around both the North Area and South Area. Initial sampling data also indicates large areas that support robust and diverse benthic infaunal communities, including one area that may be serving as a nursery area for calico scallops.

NMFS will be able to provide more specific comments during EIS review and looks forward to working with the Planning Division during project planning and development for this and other related Jacksonville Harbor projects. Thank you for providing the opportunity to provide comments early in the process. Mr. George Getsinger, at our St. Augustine office, is available if further assistance is needed.

He may be reached at 9741 Ocean Shore Drive, St. Augustine, Florida 32080, by telephone at (904) 461-8674, or by email at George.Getsinger@noaa.gov.

Sincerely,



/ for

Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

cc:

COE, Glenn.R.Schuster@usace.army.mil
EPA, Mcarthur.Christopher@epa.gov
COE, April.N.Patterson@usace.army.mil
FWS, David_hankala@fws.gov
SAFMC, Roger.Pugliese@safmc.net
FWC, lisa.gregg@MyFWC.com
FDEP, Shana.Kinsey@dep.state.fl.us
Anamar Environmental Consulting, Inc., Jseitz@anamarinc.com
F/SER47, George.Getsnger@noaa.gov

#8

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

NOV 24 2010

Planning Division
Environmental Branch

Mr. Scott Stroh, Director
Division of Historical Resources
State Historic Preservation Officer
500 South Bronough Street
Tallahassee, Florida 32399-0250

Dear Mr. Stroh:

The U.S. Army Corps of Engineers (Corps), Jacksonville District is selecting a location for a new or expanded Jacksonville Ocean Dredged Material Disposal Site (ODMDS) in the Atlantic Ocean offshore of the mouth of the St. Johns River (Figure 1). The existing Jacksonville ODMDS has been used since 1952 and was officially designated in 1983. Based on capacity modeling, site bathymetry, and anticipated levels of use, the capacity of the existing Jacksonville ODMDS will be reached in three to 8 years. As a result, the Corps has determined the need for either designation of a new ODMDS or a modification to the existing ODMDS. Continued use of the ODMDS is needed to meet future requirements of ocean disposal of dredged material from routine maintenance of Naval Station Mayport and the Federal Channel in combination with potential new construction depths of Jacksonville Harbor and Naval Station Mayport. The Corps and EPA are conducting applicable studies and are preparing and Environmental Impact Statement (EIS) to provide the information necessary to evaluate alternatives 1, 2, and 3 (Figures 2-4) and designate the future Jacksonville ODMDS.

Preliminary environmental side scan sonar survey data has identified a recent, historic sunken vessel in Alternative Site 3. A review of sub-bottom profiler data from the Florida Geological Survey has also indicated many relict river channels lie within these 3 alternative ODMDS sites.

The Corps has determined that this project has the potential to adversely affect unrecorded submerged historic properties within the proposed project areas and a submerged remote sensing cultural resources survey is needed. The purpose of the survey will be to determine if any resources exist within the project area and to evaluate their significance. The determination for the need of a survey was based on background research of the project area by Corps archeological staff.

I request your comments on this determination and welcome your input on the planned survey. If there are any questions, please contact Ms. Wendy Weaver at 904-232-2137 or e-mail at wendy.weaver@usace.army.mil.

Sincerely,

Eric P. Summa
Chief, Environmental Branch

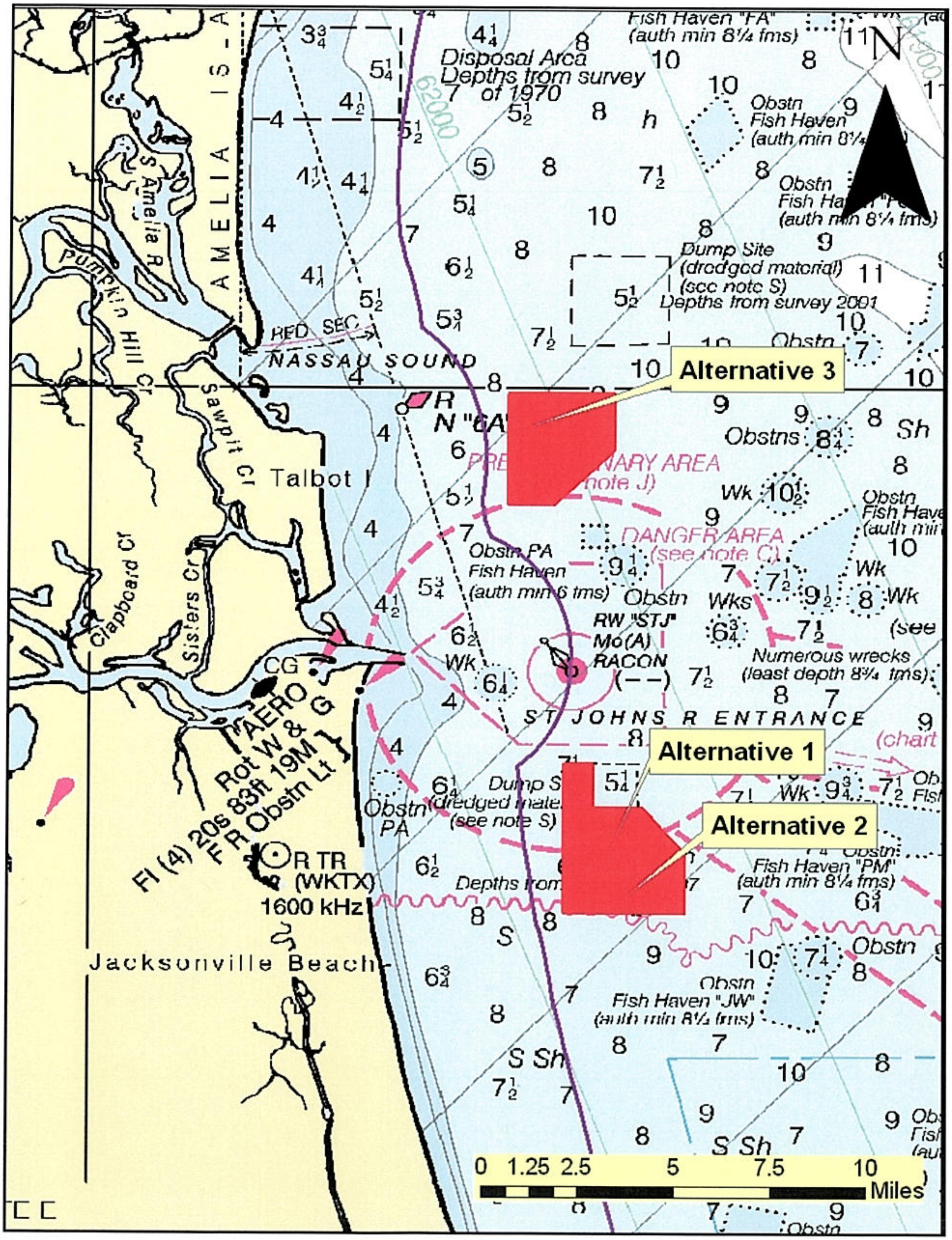


Figure 1. Jacksonville ODMDS Alternative Sites 1, 2, and 3. (Note: Sites 1 and 2 overlap.)

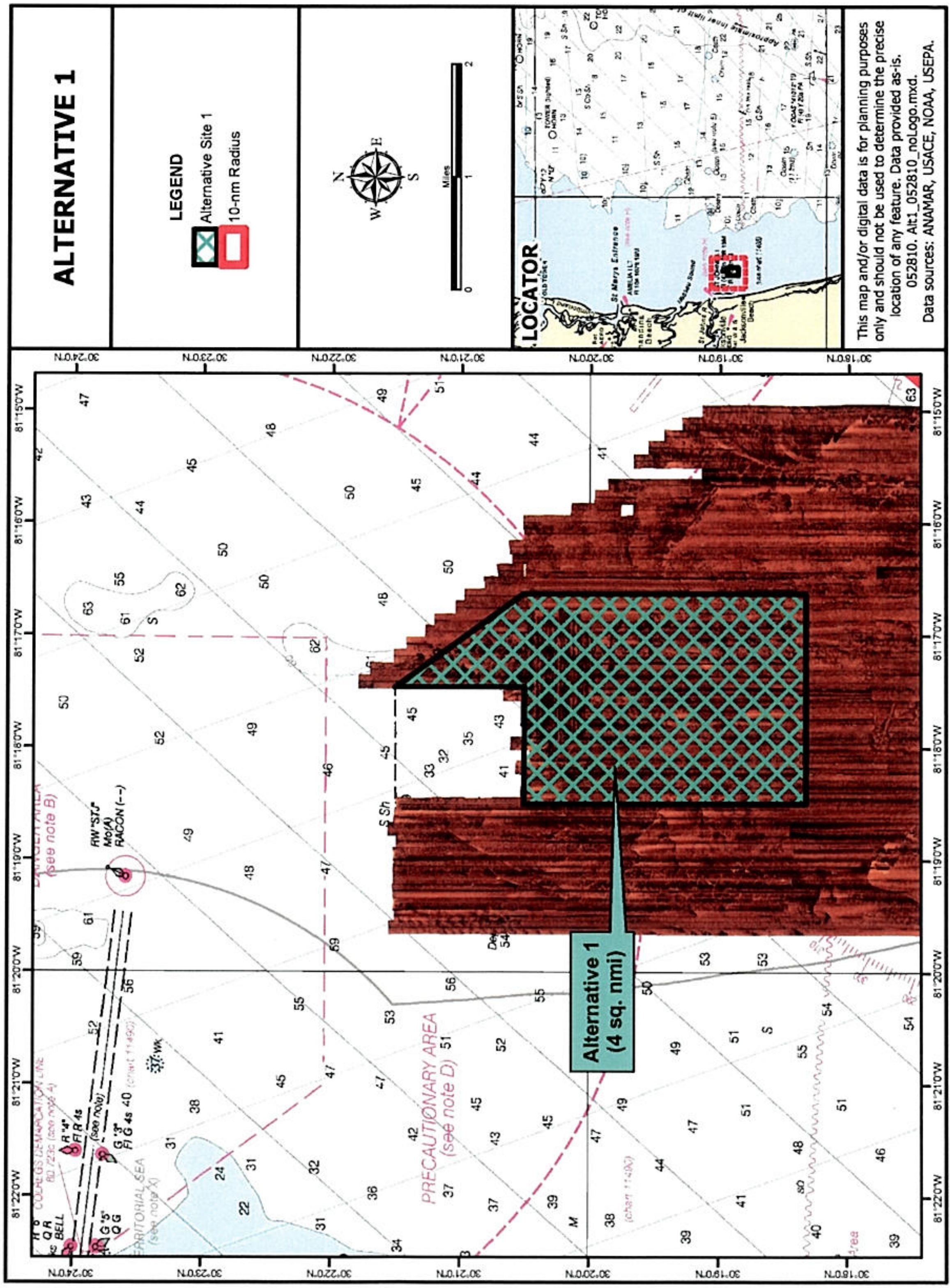


Figure 2. Alternative 1 ODMDS

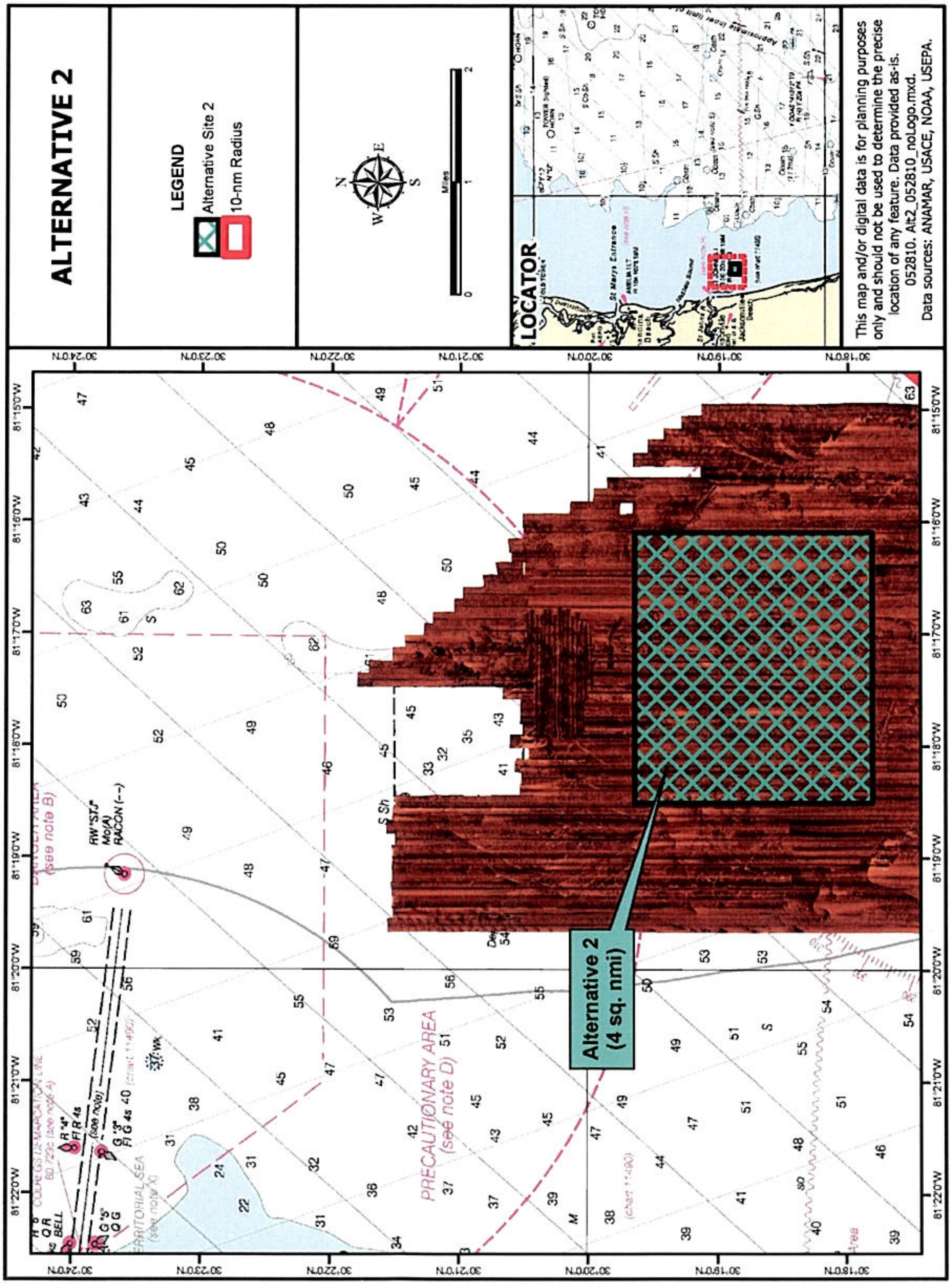


Figure 3. Alternative 2 ODMDS

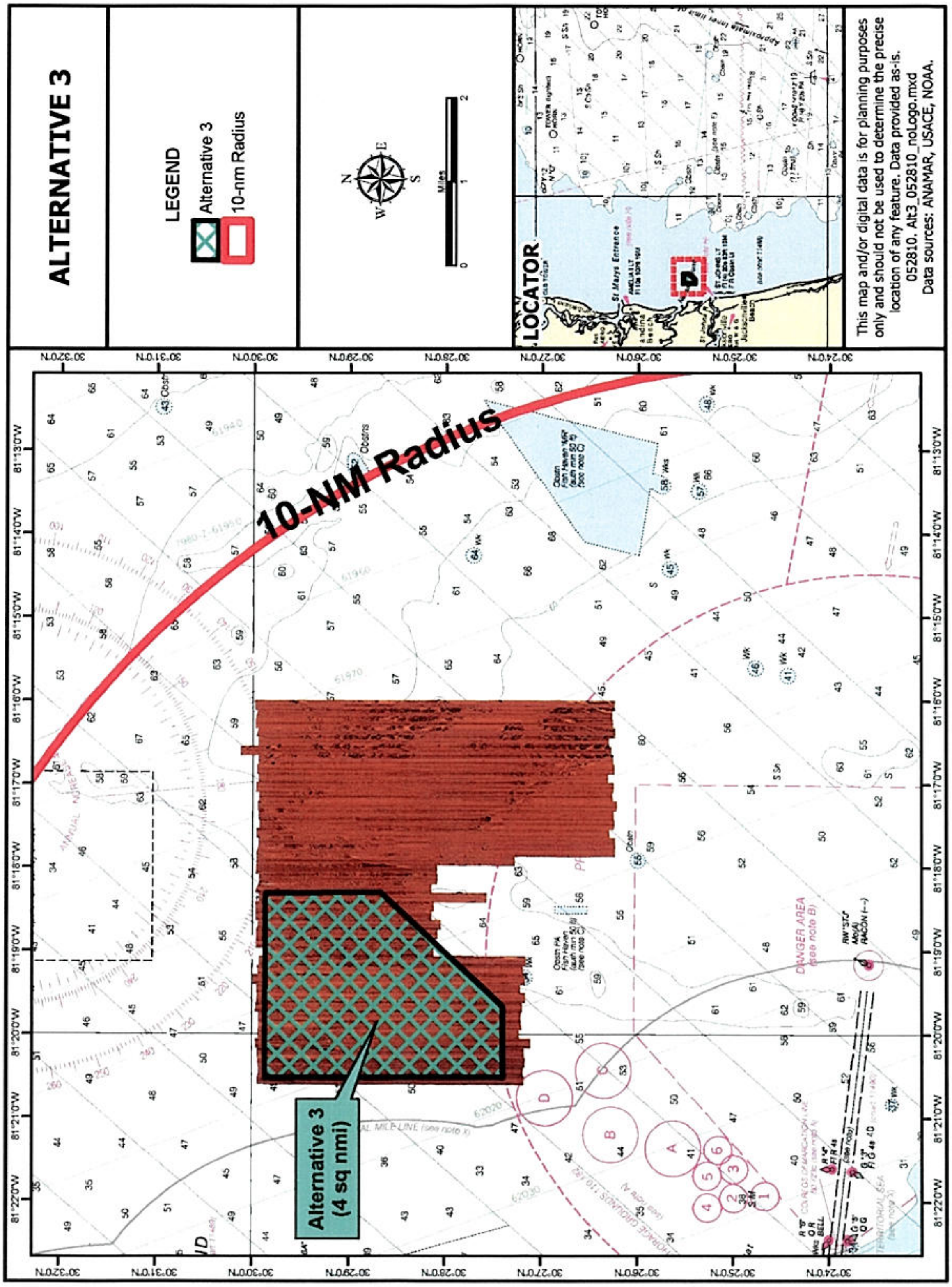


Figure 4. Alternative 3 ODMDS

#9

FLORIDA DEPARTMENT OF STATE
DIVISION OF HISTORICAL RESOURCES

Mr. Eric Summa
Planning Division
Jacksonville USACE
P.O. Box 4970
Jacksonville, Florida 32232-0019

January 5, 2011

Re: DHR Project File No. 2010-05614/ Received by DHR: November 29, 2010
Project: Jacksonville Ocean Dredged Material Disposal Site Expansion
Counties: Duval

Dear Mr. Summa:

Our office received and reviewed the above referenced project application in accordance with Section 106 of the National Historic Preservation and the National Environmental Policy Acts as amended, to assess possible adverse impacts to cultural resources (any prehistoric or historic district, site, building, structure, or object) listed, or eligible for listing, in the National Register of Historic Places.

Our office concurs with the recommendations of your agency for the necessity for submerged remote sensing cultural resource surveys of the area of potential effect for the proposed project. We look forward to reviewing the resultant survey report(s). The resultant survey report must conform to the specification set forth in Chapter 1A-46, *Florida Administrative Code,* and be forwarded to this agency in order to complete the review and consultation processes for this undertaking and its impacts to historic properties. The results of the analysis will determine if significant cultural resources would be disturbed by this development. In addition, if significant remains are located, the data described in the report and the consultant's conclusions will assist this office in determining measures that must be taken to avoid or minimize adverse impacts to archaeological sites and historical properties identified that are eligible for listing in the NRHP.

If you have any questions concerning our comments, please contact Michael Hart, Historic Sites Specialist, by phone at 850.245.6333, or by electronic mail at mrhart@dos.state.fl.us. Your continued interest in protecting Florida's historic properties is appreciated.

Sincerely,

Laura A. Kammerer

Laura A. Kammerer
Deputy State Historic Preservation Officer
For Review and Compliance

FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Mr. Eric Summa
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

January 11, 2012

Re: DHR Project File No.: 2011-05347 / 1A-32 Permit No.: 1011.072
Received by DHR: November 28, 2011
Draft Report: *Cultural Resources Remote Sensing Survey of the Jacksonville Harbor Project Potential Ocean Dredged Material Disposal Sites Alternatives 1 and 2, Duval County, Florida*

Dear Mr. Summa:

Our office received and reviewed the above referenced draft survey report in accordance with Section 106 of the *National Historic Preservation Act of 1966* (Public Law 89-665), as amended in 1992, and *36 C.F.R., Part 800: Protection of Historic Properties*, and Chapter 267, *Florida Statutes,* for assessment of possible adverse impact to cultural resources (any prehistoric or historic district, site, building, structure, or object) listed, or eligible for listing, in the National Register of Historic Places (NRHP).

Between June and August 2011, Panamerican Consultants, Inc. (PCI) conducted an underwater remote sensing survey of an area in Jacksonville Harbor proposed for ocean dredged material disposal sites (ODMDS). The survey was completed on behalf of the US Army Corps of Engineers, Jacksonville District. PCI identified fifty-five (55) magnetic anomalies, twenty-four (24) sidescan sonar contacts, and four hundred five (405) subbottom features within the surveyed area during the investigation.

PCI recommends avoidance of six areas consisting of eight magnetic anomalies (M-014, M-016, M-017, M-050, M-052, M-053, M-054, and M-055), and three subbottom features, including a protective buffer. Because a ODMDS has not yet been chosen, the Corps has not made a determination of effects at this time.

Based on the information provided, our office concurs with these determinations and finds the draft report complete and sufficient in accordance with Chapter 1A-46, *Florida Administrative Code.*

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office 850.245.6300 • FAX: 245.6436
☐ Archaeological Research 850.245.6444 • FAX: 245.6452
☑ Historic Preservation 850.245.6333 • FAX: 245.6437

For any questions concerning our comments, please contact Rudy Westerman, Historic Preservationist, by electronic mail at rjwesterman@dos.state.fl.us, or by phone at 850.245.6333. We appreciate your continued interest in protecting Florida's historic properties.

Sincerely,

Laura A. Kammerer

Laura A. Kammerer
Deputy State Historic Preservation Officer
For Review and Compliance

Pc: Panamerican Consultants, Inc.
Kevin Porter, MS 8B

APPENDIX B

Florida Coastal Zone Consistency Determination

Draft Environmental Impact Statement
for
Designation of an Ocean Dredged Material Disposal Site Offshore of Jacksonville, Florida

United States
Environmental Protection
Agency

U.S. EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303

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FLORIDA COASTAL ZONE MANAGEMENT PROGRAM FEDERAL CONSISTENCY EVALUATION PROCEDURES

DESIGNATION OF AN OCEAN DREDGED MATERIAL DISPOSAL SITE OFFSHORE OF JACKSONVILLE, FLORIDA

The purpose of this document is to request the State of Florida's agreement with the enclosed federal consistency determination for the proposed designation of a new ocean dredged material disposal site (ODMDS) off the coast of Jacksonville, Florida, for the disposal of dredged material associated with planned Jacksonville Harbor and port expansion and regular maintenance activities including Jacksonville Harbor entrance channel and Naval Station Mayport.

The 1972 Coastal Zone Management Act (CZMA) was enacted to encourage coastal states to proactively manage their natural resources. Consistent with CZMA's provisions, the State of Florida developed and obtained approval of its coastal management program (CMP) in 1981. The State's CMP consists of a network of 24 Florida Statutes (i.e., enforceable policies) administered by the Florida Department of Environmental Protection (FDEP) and a group of partner agencies responsible for implementing the statutes. The Offshore Projects Unit, located in the FDEP's Office of Intergovernmental Programs coordinates consistency review of those federal activities proposed in offshore waters, i.e., this proposed ODMDS designation off the northeast coast of Florida in the Atlantic Ocean.

Federal consistency is the CZMA provision where those federal actions having reasonably foreseeable effects on any land or water use or natural resource of the coastal zone should be consistent with the enforceable policies of a coastal state's federally approved CMP. CZMA defines four types of federal actions: 1) federal agency activities, 2) federal license or permit activities, 3) outer continental shelf (OCS) plans, and 4) federal assistance to state and local governments.

1.0 Federal Agency Action

CZMA defines federal agency activities as those activities, including development projects, performed by a federal agency, or a contractor for the benefit of a federal agency [15 C.F.R. Part 930, subpart C.]. The proposed action is the designation of an additional ODMDS by one federal agency, the U.S. Environmental Protection Agency Region 4 (EPA), for the use of another federal agency, the U. S. Army Corps of Engineers Jacksonville District (USACE).

USACE has requested that the EPA designate an additional 4 nmi^2 ODMDS offshore of the mouth of the St. Johns River for the disposal of dredged material primarily from the Jacksonville Harbor Federal Navigation Project and from Naval Station Mayport.

2.0 Purpose

The purpose of the proposed action (designation of an ODMDS) is to ensure that adequate environmentally acceptable and economically and logistically feasible ocean disposal site capacity is available for the next 50 years for suitable dredged material generated from new projects and maintenance dredging in the vicinity. This site will be used for the disposal of suitable dredged material originating in the Duval County region, primarily from the Jacksonville Harbor Federal Navigation Project and Naval Station Mayport. The designation of a new ODMDS is needed to support ongoing maintenance and capital improvement projects which are important for continued economic growth of vital commercial and recreational areas in the region. As part of the site designation process, initial screening of study areas was conducted based on environmental, operational, and economic criteria to identify viable alternative sites that were evaluated in more detail during site designation studies.

Two sites have been selected as Preferred Alternatives in the Draft Environmental Impact Statement (EIS). They are Alternative 1 and Alternative 2. These two sites are described in detail in the EIS and are evaluated here for determination of consistency with the CZMA.

3.0 Florida Coastal Management Program

The FCMP Act, adopted in 1978, authorized the development of a coastal management program. The FCMP was approved by the National Oceanic and Atmospheric Administration (NOAA) in 1981. It consists of a network of 24 Florida statutes administered by eight state agencies and the five water management districts. The program is designed to ensure the wise use and protection of the state's water, cultural, historic, and biological resources to minimize Florida's vulnerability to coastal hazards; to ensure compliance with Florida's growth management laws; to protect Florida's transportation system; and to protect Florida's proprietary interest as the owner of sovereign submerged lands.

4.0 Analysis of Florida Coastal Management Program Statutes

Each of the 24 Florida statutes is evaluated in the following sections for applicability to the designation of a new ODMDS off the coast of Jacksonville, Florida. When applicable, the project's consistency with these statutes is discussed. State coastal zone that may potentially be affected by the proposed action is limited to the coastal Atlantic Ocean (within 6 km [3 nmi]).

Chapter 161—Beach and Shore Preservation

This policy authorizes the Bureau of Beaches and Coastal Systems within the Florida Department of Environmental Protection (FDEP) to regulate construction on or seaward of Florida's beaches. The proposed action would be consistent with this statute because there are no activities associated with the proposed action that would occur seaward of the mean high water line or within Florida's coastal waters; therefore, this policy is not applicable to the proposed action**.**

It should be mentioned that beach and nearshore placement are the preferred methods of disposal for beach-compatible sediments from the Jacksonville/Duval County area. Ocean disposal site designation provides an alternative disposal site when material is not compatible for beach or nearshore placement or when these alternatives are not available and/or feasible.

If beach or nearshore placement is not the preferred cost-effective alternative, USACE has various legislative authorities to share the incremental costs of beneficial use options. For example, Section 145 of the Water Resources Development Act (WRDA) of 1976 as amended by Section 933 of WRDA 1986, Section 207 of WRDA 1992, and Section 217 of WRDA 1999, authorizes USACE to place suitable dredged material on local beaches if a state or local government requests it. The incremental costs of beach placement under this authority are shared on a 65% federal and 35% non-federal basis. This project does not include construction activities that would affect beach or shoreline protection. Therefore, the proposed action will be consistent with this chapter.

Chapter 163, Part II Intergovernmental Programs—Growth Policy, County and Municipal Planning, Land Development Regulation

This policy requires local governments to prepare, adopt, and implement comprehensive plans that encourage the most appropriate use of land and natural resources in a manner consistent with the public interest. The proposed action includes no comprehensive plans for land and natural resource use as it pertains to the Florida coastal zone; therefore, this policy is not applicable to the proposed action**.**

Chapter 186—State and Regional Planning

This statute details state-level planning requirements. It requires the development of special statewide plans governing water use, land development, and transportation. The proposed action does not include any development of plans to govern water use, land development, or transportation; therefore, this policy is not applicable to the proposed action**.**

Chapter 252—Emergency Management

This policy provides for planning and implementation of the state's response to, efforts to recover from, and the mitigation of natural and manmade disasters. The proposed action would not increase Florida's vulnerability to natural disasters. The designation of a new ODMDS will not hinder the state's efforts in managing the vulnerability of the citizens or property in the vicinity of the proposed action. Assurance of sufficient disposal site capacity could fit with the goals of the Division of Emergency Management by assuring that emergency dredging could take place within the constraints of existing regulations of the transport and placement of disposal material. The proposed action would be consistent with the efforts of the Division of Emergency Management.

Chapter 253—State Lands

This statute addresses the State's *Conceptual State Lands Management Plan* – the intent of which is to guide state land management to provide maximum benefit and use (balanced public use) of each parcel. Items of interest include 1) location, evaluation, and protection of archaeological and historical resources; 2) water resources; 3) fish and wildlife resources; 4) beaches and dunes; 5) submerged grass beds and other benthic communities; 6) swamps, marshes, and other wetlands; 7) mineral resources; 8) unique natural features; 9) submerged lands; 10) spoil islands; and 11) artificial reefs. The project area lies entirely within federal waters; therefore, impacts to state-owned or sovereign submerged lands are not expected with the proposed action. This authorized project complies with the intent of this chapter.

Each item of interest is discussed below with regard to the proposed action.

1) *Location, evaluation, and protection of archaeological resources* – See Chapter 267.
2) *Water resources* – See Chapter 373.
3) *Fish and wildlife resources* – The waters between the shoreline and the western boundaries of the offshore alternative sites are important shrimp harvesting areas. A scoping meeting was held August 18, 2010 to provide an opportunity for input on the location and configuration of alternative sites with regard to the needs of local commercial shrimpers. Industry representatives provided GPS data showing shrimp trawling locations, and it was determined that during certain parts of the year, the area just seaward of the 3-nmi state/federal boundary is heavily used. Alternative site boundaries were drawn using this information to help avoid and minimize impacts as much as possible. Disposal activities are not expected to cause any lethal or long-term impacts to fish. Management of fishery stocks would not be affected by designation of a

new ODMDS and no significant impacts to fish habitats are expected; therefore, the proposed action is consistent with this policy on saltwater fisheries.

The proposed action is not expected to significantly affect wildlife. Since the alternative sites are several miles offshore, there will be no impacts to the nesting activities of the loggerhead and green sea turtles if an ODMDS is designated offshore. There is a potential for collisions with sea turtles and marine mammals, including the endangered North Atlantic right whales. However, protective measures will be implemented to reduce the risk of vessel strikes as dredges and barges are transiting to and from the disposal site. The proposed action would be consistent with this policy.

4) *Beaches and dunes* – See Chapter 161.

5) *Submerged grass beds and other benthic communities* – The proposed project area is located several miles offshore; therefore, no submerged seagrass beds will be impacted by disposal activities. With regard to benthic communities, potential impacts include direct burial of benthic organisms and change in composition of sediments reducing abundance and diversity of the benthic communities within the site. Effects of turbidity would be short-term and localized. Effects of burial and change in sediment composition can potentially be long-term depending upon the frequency of disturbance.

6) *Swamps, marshes, and other wetlands* – The proposed project area is located several miles offshore; therefore, no wetland resources will be impacted.

7) *Mineral resources* – There are no active gas or oil leases in the vicinity of the proposed project area. The Duval County sand borrow area is located near the proposed project area. The ODMDS will be managed to minimize impacts to the sand borrow area. See the Site Management and Monitoring Plan (Appendix F) of the EIS for details.

8) *Unique natural features* - There are no known physical, geological, or biological characteristics that are exclusively unique to the proposed project area.

9) *Submerged lands* – The proposed project area is located several miles offshore; therefore, no submerged lands will be impacted by disposal activities.

10) *Spoil islands* – There are no spoil islands in the vicinity of the proposed project area.

11) *Artificial reefs* - The proposed project area is approximately 3-4 nmi west of the nearest artificial reef. Rock disposal within the ODMDS will be managed separately from other dredged material (sand, silt, clay). This may result in the creation of some reef habitat in that zone of the ODMDS. See the Site Management and Monitoring Plan (Appendix F) of the EIS for details on how rock will be managed within the site.

Chapter 258—State Parks and Preserves

This policy addresses administration and management of state parks and preserves. The proposed action does not include any activity within a state park or aquatic preserve. No reasonably foreseeable significant impacts to state parks or aquatic preserves are expected as a result of implementation of the proposed action; therefore, the proposed action is consistent with this chapter.

Chapters 259—Land Acquisition for Conservation and Recreation

This policy authorizes acquisition of environmentally endangered lands and outdoor recreation lands. Due to the offshore location of the ODMDS, the proposed action would not affect any land acquisition for conservation and recreation; therefore, this policy is not applicable.

Chapter 260—Florida Greenways and Trails Act

This policy authorizes acquisition of land to create a recreational trails system and to facilitate management of the system. Due to the offshore location of the ODMDS, the proposed action would not affect any land acquisition for recreational trail; therefore, this policy is not applicable.

Chapter 267—Historical Resources

This policy addresses management and preservation of Florida's archaeological and historical resources. Consultation with the Florida SHPO was initiated in November 2010 and is ongoing in accordance with the NHPA of 1966, as amended, and as part of the requirements and consultation processes contained within the NHPA implementing regulations of 36 CFR 800. This project is also in compliance through ongoing consultation with the Archeological Resources Protection Act (96-95); Abandoned Shipwreck Act of 1987 (PL 100-298; 43 U.S.C. 2101-2106); American Indian Religious Freedom Act (PL 95-341); Executive Orders 11593, 13007, and 13175; and the Presidential Memo of 1994 on Government to Government Relations. Consultation is ongoing with the SHPO and appropriate federally recognized tribes. Additional comments and recommendations will be included in Appendix A and will be incorporated into the Final EIS.

A submerged cultural resources survey was conducted within Alternative Sites 1 and 2. Alternative Site 3 was not surveyed because it is not a preferred alternative. Within Alternative Site 1, the survey indicates one magnetic and one subbottom anomaly for avoidance. Within Alternative Site 2, the survey indicates two magnetic and two subbottom anomalies for avoidance. The three magnetic anomalies have characteristics indicative of shipwrecks. The subbottom anomalies represent prehistoric landforms once exposed by lower sea levels and have the potential to contain prehistoric sites.

There is a potential for submerged historic properties to be adversely impacted by the proposed action. Targets within the designated site will be avoided or buffered to prevent adverse project impacts, and if not feasible, will be identified before construction.

Chapter 288—Commercial Development and Capital Improvements

This policy provides the framework for promoting and developing the general business, trade, and tourism components of the state economy. The proposed action would not directly involve any commercial development or capital improvements that would affect the business, trade, or tourist components of the state economy; however, this action may indirectly facilitate port expansion by increasing dredged material disposal capacity which would be needed for the Jacksonville Harbor Deepening Project. The expansion of the port would promote development of the general business, trade, and tourism components of the state economy.

Chapter 334—Transportation Administration

Chapter 334 addresses the state's policy concerning transportation administration. The proposed action would not affect transportation; therefore, this policy is not applicable.

Chapter 339—Transportation Finance and Planning

This statute addresses the finance and planning needs of the state's transportation system. The proposed action would not directly affect transportation; however, this action may indirectly facilitate port expansion by increasing dredged material disposal capacity which would be needed for the Jacksonville Harbor Deepening Project. The deepening of Jacksonville Harbor and expansion of the port would enhance transportation in the area.

Chapter 373—Water Resources

This policy addresses the state's policy concerning water resources. Disposal of dredged material will cause short-term impacts to water quality due to increases in turbidity during disposal activities. Increased turbidity can clog fish gills and decrease oxygen levels and photosynthesis; however, in this case the increased turbidity would not pose a significant impact, given its limited duration. Additionally, in coastal waters, suspension of bottom sediments resulting in increased turbidity is a natural occurrence caused by passing coastal storms. Also, each dredging project involving the use of the ODMDS would be required to detail impacts to water resources, water quality, and environmental quality as part of the Section 103 permitting process specified by applicable federal regulations. Therefore, the proposed action is consistent with this policy.

Chapter 375—Outdoor Recreation and Conservation Lands

This statute authorizes the State of Florida to acquire lands, water areas, and related resources for outdoor recreation and conservation. The designation of a new ODMDS would not affect the development of a comprehensive multipurpose outdoor recreation plan that documents recreational supply and demand, describes current recreational opportunities, estimates need for additional recreational opportunities, and proposes means to meet the identified needs. Therefore, this statute is not applicable.

Chapter 376—Pollutant Discharge Prevention and Removal

This policy regulates transfer, storage, and transportation of pollutants and cleanup of pollutant discharges. The designation of an ODMDS does not involve the discharge of pollutants to estuarine or marine waters; however, the site would be used during dredging projects for the placement of suitable dredged material. Approval for individual dredging projects would be contingent upon adherence to applicable federal regulations concerning the transport and disposal of dredged material. Therefore, the proposed action is consistent with this policy.

Chapter 377—Energy Resources

This statute addresses regulation, planning, and development of energy resources of the state. The proposed action would not affect regulation, planning, or development of energy resources; therefore, this policy is not applicable.

Chapter 379 – Fish and Wildlife Conservation

This statute provides a framework for management and protection of the state of Florida's wide diversity of fish and wildlife resources. The enforceable policies contained in this statute authorize the Florida Fish and Wildlife Conservation Commission (FWC) to manage and protect the state's marine life, freshwater aquatic life, and wild animal life. It is the policy of the state to conserve and wisely manage these resources. Particular attention is given to those species defined as being endangered or threatened.

The proposed action is not expected to significantly affect wildlife. Since the alternative sites are several miles offshore, there will be no impacts to the nesting activities of the loggerhead and green sea turtles if an ODMDS is designated offshore. There is a potential for collisions with sea turtles and marine mammals, including the endangered North Atlantic right whales. However, protective measures will be implemented to reduce the risk of vessel strikes as dredges and barges are transiting to and from the disposal site. The proposed action would be consistent with this policy.

Chapter 380—Land and Water Management
This policy establishes land and water management policies to guide and coordinate local decisions relating to growth and development. The proposed action occurs in federal offshore waters and does affect land and water management policies; therefore, this policy is not applicable.

Chapter 381—Public Health, General Provisions

This statute relates to public policy concerning the state's public health system. The proposed action does not involve the construction of an on-site sewage treatment and disposal system; therefore, this policy is not applicable.

Chapter 388—Mosquito Control

This statute addresses mosquito control efforts in the state. The proposed action would not affect mosquito control; therefore, this policy is not applicable.

Chapter 403—Environmental Control

This statute establishes public policy concerning environmental control in the state. USACE and EPA will evaluate all federal dredged material disposal projects in accordance with criteria given in the Ocean Dumping Regulations (40 CFR 220-229), the USACE regulations (33 CFR 209.120 and 209.145), and any state requirements. USACE will also issue permits to private dredged material disposal projects after review under the same regulations. EPA has the right to disapprove any ocean disposal project if, in its judgment, all provisions of the Marine Protection, Research, and Sanctuaries Act and associated implementing regulations have not been met. These regulations are consistent with enforceable policies of the state; therefore, the proposed action is consistent with this chapter.

Chapter 553 – Building Construction Standards
This statute is known as the Florida Building Codes Act and addresses building construction standards and provides for a unified Florida Building Code. The proposed action does not involve the construction of buildings; therefore, this policy is not applicable.

Chapter 582—Soil and Water Conservation

This policy provides for the control and prevention of soil erosion. The proposed project area is not located near agricultural lands; therefore, this policy is not applicable.

Chapter 597 – Aquaculture
This statute is known as the Florida Aquaculture Policy Act and establishes public policy concerning the cultivation of aquatic organisms in the state. The proposed action does not involve aquaculture; therefore, this policy is not applicable.

5.0 Conclusion

The proposed action as described in the project EIS is consistent to the maximum extent practicable with the enforcement policies of the above-mentioned Florida statutes.

APPENDIX C

Biological Assessment

Draft Environmental Impact Statement
for
Designation of an Ocean Dredged Material Disposal Site Offshore of Jacksonville, Florida

United States Environmental Protection Agency

U.S. EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303

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Biological Assessment for Designation of an Ocean Dredged Material Disposal Site off Jacksonville, Florida

Contract Number W912EP-09-C-0058

Submitted to

U.S. Army Corps of Engineers
701 San Marco Boulevard
Jacksonville, FL 32207

Submitted by

ANAMAR Environmental Consulting, Inc.
2106 NW 67th Place, Suite 5
Gainesville, FL 32653

ANAMAR
Environmental Consulting, Inc.

May 2012

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ACRONYMS AND ABBREVIATIONS

ASMFC	Atlantic States Marine Fisheries Commission
ASSRT	Atlantic Sturgeon Status Review Team
BA	biological assessment
CDF	confined disposal facility
CEQ	Council of Environmental Quality
cy	cubic yards
DoN	Department of the Navy
DPS	Distinct Population Segment
EIS	Environmental Impact Statement
EPA/USEPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EWS	early warning system
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Fish and Wildlife Research Institute
MLLW	mean lower low water
NARW	North Atlantic right whale
NARWC	North Atlantic Right Whale Consortium
NAVFAC	Naval Facilities Engineering Command
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
nmi	nautical mile(s)
ODMDS	ocean dredged material disposal site
ROI	region of influence
SRT	Status Review Team
USACE	U.S. Army Corps of Engineers
USEPA, EPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

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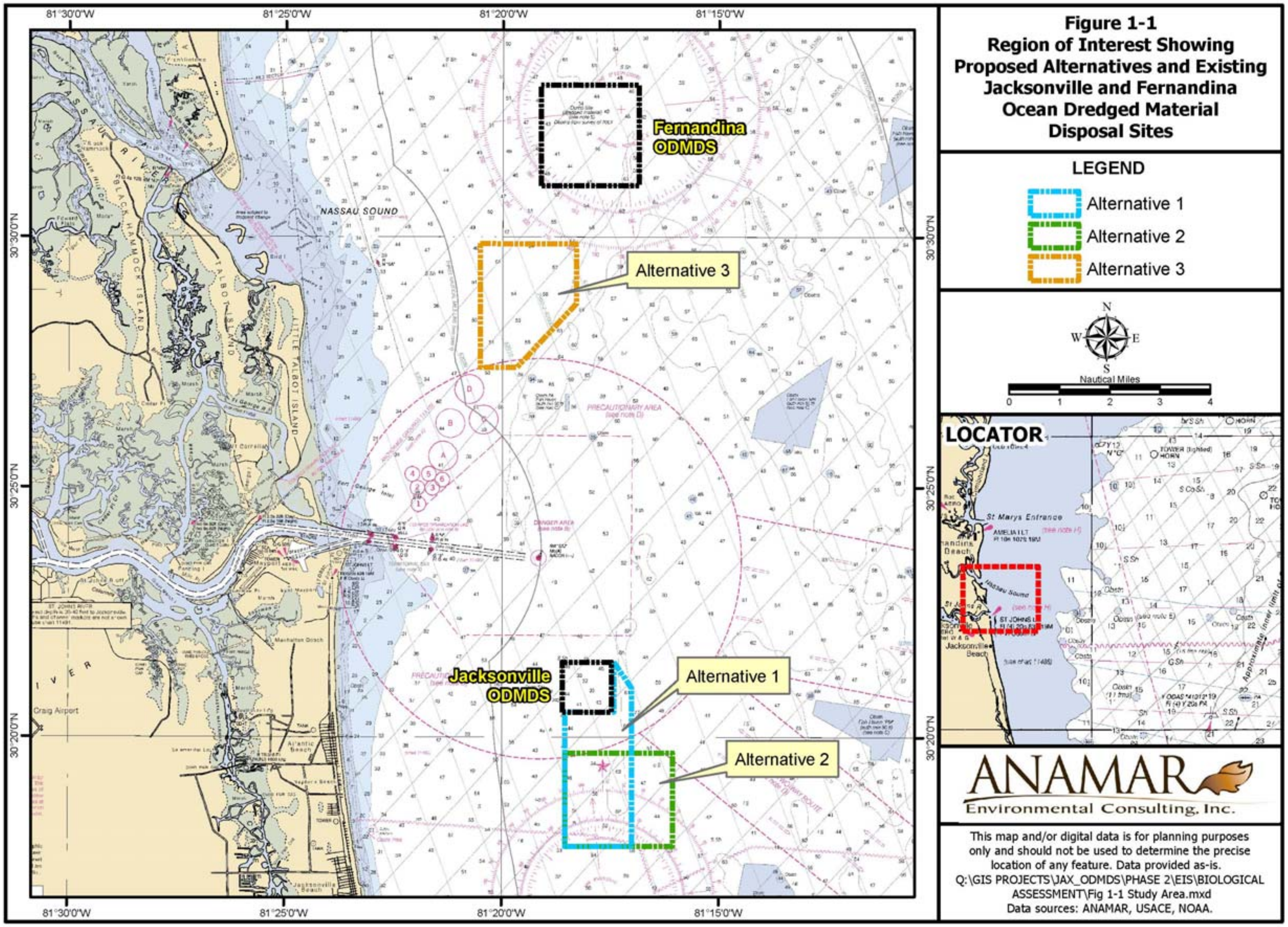
1. INTRODUCTION

The U.S. Environmental Protection Agency Region 4 (EPA) proposes to designate a new 4-square nautical mile (nmi^2) ocean dredged material disposal site (ODMDS) offshore of Jacksonville, Duval County, Florida. Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that any action is not likely to jeopardize the continued existence of any endangered or threatened species, including destruction or adverse modification of these species' critical habitats. This Biological Assessment (BA) has been prepared in accordance with Section 7 of the ESA to analyze potential impacts to nine species under the jurisdiction of the National Marine Fisheries Service (NMFS) known to occur within the action area.

1.1. Purpose and Need for Proposed Action

The existing Jacksonville ODMDS is located approximately 5 nmi southeast of the mouth of the St. Johns River on the continental shelf off the east coast of Florida (Figure 1-1). It is 1 nmi by 1 nmi (1 nmi^2) in size and is the primary site for placement of dredged material originating from the Jacksonville Harbor Federal Navigation Project and Naval Station Mayport. Due to potential capacity issues at this site, the U.S. Army Corps of Engineers Jacksonville District (USACE) and EPA have identified a need to either expand the existing Jacksonville ODMDS or designate a new ODMDS in the vicinity. The need for expanding current ocean disposal capacity is based on observed mounding, future capacity modeling, historical dredging volumes, lack of upland confined disposal facilities (CDF), and estimates of future proposed projects. Based on this information, USACE estimates the existing Jacksonville ODMDS may reach capacity as early as 2013.

The purpose of the proposed action (designation of an ODMDS) is to ensure that adequate environmentally acceptable and economically and logistically feasible ocean disposal site capacity is available for the next 50 years for suitable dredged material generated from new projects and maintenance dredging in the vicinity. This site will be used for the disposal of suitable dredged material originating in the Duval County region that is in compliance with the Ocean Dumping Criteria (40 CFR 227). The availability of suitable ocean disposal sites to support ongoing maintenance and capital improvement projects is essential for the continued use and economic growth of vital commercial and recreational areas in the region. As part of the site designation process, initial screening of alternative sites based on environmental, operational, and economic criteria were conducted to identify viable alternative sites that were evaluated in more detail during the site designation studies. These alternatives are described in detail in Chapter 2 of the Environmental Impact Statement (EIS). The EIS evaluates the potential physical, chemical, biological, and socioeconomic impacts associated with the proposed designation of the new ODMDS offshore of Jacksonville, Florida. The alternatives considered in the EIS and in this BA include the expansion of the existing Jacksonville ODMDS (Alternative 1), designation of a new site south of the Jacksonville ODMDS (Alternative 2), designation of a new site north of the Jacksonville ODMDS (Alternative 3), and the No Action Alternative (Figure 1-1).



81°30'0"W
81°25'0"W
81°20'0"W
81°15'0"W
30°30'0"N
30°25'0"N
30°20'0"N
Fernandina ODMDS
Jacksonville ODMDS
Alternative 1
Alternative 2
Alternative 3
NASSAU SOUND
Figure 1-1
Region of Interest Showing Proposed Alternatives and Existing Jacksonville and Fernandina Ocean Dredged Material Disposal Sites
LEGEND
Alternative 1
Alternative 2
Alternative 3
N
S
E
W
Nautical Miles
0
1
2
3
4
LOCATOR
ANAMAR
Environmental Consulting, Inc.
This map and/or digital data is for planning purposes only and should not be used to determine the precise location of any feature. Data provided as-is.
Q:\GIS PROJECTS\JAX_ODMDS\PHASE 2\EIS\BIOLOGICAL ASSESSMENT\Fig 1-1 Study Area.mxd
Data sources: ANAMAR, USACE, NOAA.

1.2. Description of Action Area

The action area (or region of influence [ROI]) is defined as the geographic area in which listed species could potentially be affected by the proposed action. Since vessels will be transiting between the St. Johns River and the designated site during dredged material disposal activities, the marine habitats inshore of the alternatives sites are also considered in this assessment. Therefore, the action area includes marine areas in the vicinity of the alternative sites and the areas that vessels would transit between the dredge project area and the proposed alternative sites (Figure 1-1).

The three alternative sites are situated on the inner continental shelf from approximately 6.7 to 9.3 nmi from the mouth of the St. Johns River. Depths range from approximately 43 to 66 feet mean lower low water (MLLW). The ocean bottom is characterized by sand ridges and regular and irregular large-scale bedforms as evidenced in sidescan imagery collected in October 2009 and March 2010, suggesting varying hydrodynamic influences, including tidal, longshore, and storm-derived currents. The bottom substrate is predominantly fine and medium quartz sand with fine shell fragments and traces of silt. Discrete areas of hardbottom are present near the existing Jacksonville ODMDS and appear as isolated piles and some more dispersed limestone material, ranging from pebble- to boulder-sized. The shape, pattern, and distribution of these features, along with historical use of the ODMDS to the south and east of existing boundaries, suggest that they are from prior disposal events. Hardbottom ledges and patchy low-relief reefs are present to the east of Alternative 3. Hardbottom habitats within and adjacent to each alternative site were groundtruthed and mapped. For a more detailed discussion of these habitats, see *Final Report and Addendum to Final Report – Jacksonville ODMDS Reconnaissance Sidescan Sonar Survey* (ANAMAR 2010).

1.3. Listed and/or Proposed Species or Critical Habitat Within the Action Area

Based on the species lists reviewed by NMFS, nine species listed under the ESA as endangered and threatened under the jurisdiction of NMFS potentially occur within the action area (Table 1-1) (NMFS 2010a). In addition, critical habitat has been designated for the North Atlantic right whale. The BA addresses the potential impacts of designating a new ODMDS offshore of Jacksonville, Florida on these federally listed species and critical habitat. This BA is based upon literature review; data from NMFS, the U.S. Fish and Wildlife Service (USFWS), the Florida Fish and Wildlife Conservation Commission (FWC); and previous agency consultations on similar projects in the vicinity such as *Final EIS for the Proposed Homeporting of Additional Surface Ships at Naval Station Mayport, Florida* (NAVFAC 2008).

Table 1-1. ESA-Listed Species and Critical Habitat under the Jurisdiction of NMFS Potentially Occurring within the Action Area

Common Name	Scientific Name	Status
SEA TURTLES		
Loggerhead sea turtle	*Caretta caretta*	Threatened
Green sea turtle	*Chelonia mydas*	Endangered/Threatened[1]
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
MARINE FISH		
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered
Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*	Proposed Endangered[2]
Smalltooth sawfish	*Pristis pectinata*	Endangered
MARINE MAMMALS		
North Atlantic right whale	*Eubalaena glacialis*	Endangered; critical habitat designated[3]
Humpback whale	*Megaptera novaeangliae*	Endangered

1 Green turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered.

2 The Atlantic sturgeon is currently proposed to be listed as endangered

3 Based on the 2006 relisting of separate right whale species in the northern Pacific and northern Atlantic oceans, NMFS is in the process of re-designating critical habitat for the North Atlantic right whale. A proposed critical habitat rule for the North Atlantic right whale (NARW) will be submitted to the Federal Register for publication in the second half of 2011. As of February 2012, no ruling has been made.

Source: NMFS 2010a

2. DESCRIPTION OF LISTED SPECIES AND CRITICAL HABITAT THAT MAY BE AFFECTED BY THE PROPOSED ACTION

A total of nine threatened, endangered, or proposed endangered species under the jurisdiction of the NMFS potentially occur within or in the vicinity of the action area (Table 1-1). The Atlantic sturgeon is included in this analysis because a determination to list this species as endangered is currently underway (NMFS 2010b). This section describes these species and their associated critical habitat.

2.1. Sea Turtles

2.1.1. Loggerhead Sea Turtle

Loggerhead sea turtles have a wide distribution including the Atlantic, Pacific, and Indian oceans. Loggerheads nest in the temperate and subtropical regions of their geographic distribution, and in the U.S. the most common nesting areas include the coastal region between North Carolina and Florida, including the Florida Gulf coast. In the southeastern U.S., the nesting season for loggerheads is late May through early September. Females lay approximately five nests annually on high-energy beaches characterized as narrow and steeply sloped with coarse-grained sand. There is a 2-month incubation period after which eggs hatch, resulting in births from June through November. Hatchlings struggle through the surf and attempt to swim away from land until they are able to take refuge in the downward current of surface water of the ocean. Several months are often spent in these nursery areas until ocean currents move the young turtles farther offshore to grow. A pelagic existence can last between 7 and 12 years for juveniles before migration back to nearshore coastal areas to mature until adulthood. Western North Atlantic adult loggerheads forage predominately in areas throughout the relatively shallow continental shelf waters of the U.S., Bahamas, Cuba, and the Yucatán Peninsula, Mexico. Adults migrate between foraging habitats and beaches for nesting along the continental shelf or long distances across oceanic waters (NMFS and USFWS 1993; DoN 2002).

The loggerhead turtle was listed as threatened in 1978 (NMFS 1978), and there are concerns for this species due to numerous human activities that impact nesting areas including alterations of beaches, such as beach armoring to prevent erosion for beachfront development or beach nourishment to replace sand lost to natural erosion. Adult mortality can be caused by a number of factors, including, but not limited to, coastal development that destroys foraging habitat and numerous types of fisheries that involve bycatch (NMFS and USFWS 1993). Although populations appear to be rebounding in some areas of their distribution, this is not the case in all areas. Data collected by USFWS indicated a steady and steep decline in the number of nests sighted in Florida from 1998 through 2007 (NMFS and USFWS 2007a). NMFS has determined that the loggerhead turtle has nine distinct population segments (DPSs). As of 2012, four DPSs are listed as threatened and five are listed as endangered, including the northwest Atlantic Ocean DPS (http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm, accessed 2/27/12).

Approximately 90% of all loggerhead nesting in the continental U.S. takes place in Florida (FWRI 2007a). The 2011 FWC Index Nesting Beach Survey results indicate loggerhead nest counts on Florida's index beaches have declined from a peak of nearly 60,000 in 1998. A detailed analysis of Florida's long-term loggerhead nesting data (1989-2011) revealed that following a 24% increase between 1989 and 1998, nest counts declined 16% between 1998 and 2011. However, the recent trend may be stabilizing. Loggerhead sea turtle nest counts in 2011 were close to the average for the preceding 5-year period (http://myfwc.com/research/wildlife/sea-turtles/nesting/beach-survey-totals/, accessed 2/27/12). In Duval County, nesting totals have fluctuated, but have shown an overall increase between 1990 and 2011. Table 2-1 contains 1990 to 2011 nesting data for loggerhead, leatherback, and green sea turtles in Duval County.

The beaches inshore of the action area are habitat for loggerhead nesting, and the nearshore areas are sufficient for pelagic juvenile habitat and adult feeding activities (NAVFAC 2008). Loggerheads are the most commonly sighted sea turtles off the Atlantic coast of north Florida (DoN 2002) and are expected to occur in the vicinity of the alternative sites throughout the year.

Table 2-1. Sea Turtle Nesting Data for Duval County, Florida (1990-2011)

Year	Loggerhead	Leatherback	Green
1990	43	0	0
1991	40	0	0
1992	29	0	0
1993	30	1	0
1994	78	0	0
1995	54	0	0
1996	69	0	0
1997	63	0	0
1998	72	1	2
1999	119	2	0
2000	80	0	1
2001	87	1	0
2002	55	0	0
2003	88	2	0
2004	41	0	1
2005	67	0	3
2006	103	0	4
2007	36	2	0
2008	99	1	1
2009	81	5	0
2011	152	3	3

1990-2006 data sources: FWRI 2007a,c,d
2007-2011 data source: FWRI 2011

2.1.2. Kemp's Ridley Sea Turtle

The historic distribution of the Kemp's ridley sea turtle includes the Gulf coasts of Mexico and the U.S. and the Atlantic coast of North America. Kemp's ridley sea turtles are shallow-water benthic feeders often found foraging in embayments. They nest in large aggregations called arribadas, which are speculated to enhance survival of eggs due to "safety in numbers." The majority of nesting activities occurs in one isolated area of Mexico, with limited nesting occurrences reported in Texas and no nesting occurrences recorded on the Atlantic coast of the U.S. (NAVFAC 2008). Kemp's ridley populations have declined more than any other sea turtle species and was listed as endangered in 1970 (NMFS and USFWS 1992a; 2007a).

From 1979 through 2006 there were no records of Kemp's ridley nesting in Duval County (FWRI 2007b). Part of the post-juvenile distribution includes the Atlantic coast through Florida, and occurrence is mainly seasonal for feeding. The shallow waters of the southeastern U.S. are suitable habitat for all life stages of this species throughout much of the year, and Kemp's ridley sea turtles are expected to occur year-round in waters between the shoreline and the 50-meter isobath. The waters off the Atlantic coast of north Florida, including the alternative sites, are most suitable for Kemp's ridley sea turtles from May through October (DoN 2002).

2.1.3. Green Sea Turtle

Green sea turtles are distributed throughout the world's oceans, and in the Western Atlantic they range from Massachusetts to Argentina, including the Gulf of Mexico and the Caribbean. In the summer when water is warmer the distribution is broad, but in general these animals are not found north of Cape Hatteras along the Atlantic coast. For U.S. populations, nesting occurs primarily in the U.S. Virgin Islands, Puerto Rico, and the Atlantic coast of Florida. Nesting season takes place from April through September with an incubation period of approximately 2 months. Because green sea turtles are herbivores and feed primarily on sea grasses and algae, adults are found in nearshore areas. Juveniles are found more offshore rafting in algae and leading a pelagic existence until adulthood. The green turtle was protected under the ESA in 1978, with breeding populations in Florida, the Pacific Ocean, and Mexico listed as endangered and all others as threatened. Current threats include loss of nesting habitat, death as fisheries bycatch, and poaching. A status review of the endangered nesting populations recommended that the populations remain listed as endangered, as currently there is not evidence that these populations have recovered (NMFS and USFWS 2007b).

Green turtle nest counts have increased approximately tenfold from 1989 to 2011, a trend that differs markedly from that of the loggerhead. The nest count in 2011 was the highest for that period (http://myfwc.com/research/wildlife/sea-turtles/nesting/beach-survey-totals/, accessed 2/27/12). Although green sea turtles are known to nest in substantial numbers in the southeast U.S., in Florida they typically nest along the beaches from Brevard County south to Broward County, south of the action area (DoN 2002). However, they do nest in very low numbers along the beaches of Duval County. In 2011, 3 green turtle nests were recorded in Duval County (Table 2-1) (FWRI 2011).

South of North Carolina, green sea turtles are expected to occur year-round in waters between the shoreline and the 50-meter isobath. The preferred habitats of this species are seagrass beds and worm-rock reefs, which are located primarily in shallow water environments along the Atlantic coast. Green sea turtles are expected to occur within the vicinity of the alternative sites throughout the year.

2.1.4. Leatherback Sea Turtle

Leatherback sea turtles are broadly distributed throughout the Atlantic, Pacific, and Caribbean Oceans and the Gulf of Mexico, with a relatively high tolerance for extreme temperatures. This high temperature tolerance allows for long migrations through areas with varying oceanographic conditions (DoN 2002). In addition to extreme thermal tolerances, leatherbacks are known to be deep divers (over 300 feet) and spend a large amount of time offshore in deeper waters (Eckert et al. 1989). The hypothesized reason for the offshore preference is that leatherback sea turtles feed on jellyfish and other pelagic animals that are found most commonly offshore (Eckert 1995). Although generally a deep-diving pelagic species, seasonal movement into coastal waters to feed on large jellyfish that are associated with rivers and frontal boundaries has been documented. Leatherback sea turtles nest from March through July, with an incubation period of 55 to 75 days (DoN 2007a). The majority of nesting occurs along the coasts of Mexico, but nesting also occurs at various Caribbean locations and the Atlantic coast of Florida (Conley and Hoffman 1987). The leatherback sea turtle was listed as endangered in 1970 (NMFS and USFWS 1992b). The decline in numbers of leatherback sea turtles is mainly attributed to nesting habitat degradation; illegal harvest of adults and eggs; incidental take such as by-catch, entanglement, and dredging-related takes; and pollution (Eckert 1995).

Surveyors counted a near-record number of leatherback nests on index beaches in Florida in 2011. Similar to the nest counts for green turtles, leatherback nest counts have been increasing exponentially. From 1989 through 2011, leatherback nests at core index beaches numbered from 27 to 615 (http://myfwc.com/research/wildlife/sea-turtles/nesting/beach-survey-totals/, accessed 2/27/12). Leatherbacks typically nest along the beaches from Brevard County south to Broward County, south of the vicinity of the action area. However, they do nest in very low numbers along the beaches of Duval County. In 2011, three leatherback turtle nests were recorded in Duval County (Table 2-1) (FWRI 2011).

Leatherbacks are the second most commonly seen sea turtle, after loggerheads, off the Atlantic coast of north Florida (DoN 2002) and are expected to occur within the vicinity of the alternative sites throughout the year.

2.2. Marine Mammals

2.2.1. North Atlantic Right Whale

The historic range of the North Atlantic right whale (NARW) was from temperate areas to subarctic locations in the North Atlantic Ocean (NAVFAC 2008). Some individuals have been sighted migrating over extremely deep waters, but most sightings occur in coastal and continental shelf waters. Individuals have been reported as far south as the Gulf of Mexico, although these occurrences are rare. Currently, their distribution is highly influenced by season and specific activities. Calving occurs between November and April in southeastern U.S. waters. The coastal waters off Georgia and northern Florida are the only known calving ground for the North Atlantic right whale, with calving occurring between December and March (Figure 2-1) (DoN 2007b). Feeding primarily occurs from spring until fall in coastal waters of the northeastern U.S. and Canada where their prey (zooplankton) is abundant. When North Atlantic right whales are not occupied with reproductive or paternal duties, their distribution is strongly linked to the distribution of their prey, which is comprised of various zooplankton species, particularly those with high lipid content. Migration for feeding is a critical activity, as both the quality and quantity of their food source are important. Although general distributional patterns do exist, information for many individuals throughout the winter is not well documented (NMFS 2004, 2006a).

Ship collisions and entanglement in fishing gear are the primary causes of injury and death in the population. According to the NMFS Large Whale Ship Strike Database, as of 2004, North Atlantic right whales were the fourth most commonly struck whale species in the world. The region comprised of the southeastern U.S. and Caribbean had the fifth highest number of vessel strikes on all whale species in the world and was the leader in vessel strikes for all of North America. When speed was recorded for individual vessel strike events, the most common vessel speed was 13 to 15 knots. Substantially fewer strikes occurred for vessels traveling at speeds less than 10 knots (Jensen and Silber 2004). Additional factors such as habitat degradation, contaminants, predators, and past whaling activities have all contributed to the endangered status of the North Atlantic right whale (NMFS 2007b). Of particular concern are dredging activities, as individuals have been sighted in shipping channels and other areas where dredging is common. This has led to agencies encouraging dredging operations to adopt protective measures, such as posting lookouts on hopper dredge vessels and adherence to recommended precautionary guidelines for operations to reduce the risk of collision (NMFS 2004).

According to the 2011 North Atlantic right whale report card released annually by the North Atlantic Right Whale Consortium (NARWC), the best estimate of catalogued North Atlantic right whale population was 490 individuals (NARWC 2011). Even though population estimates are extremely low, there is hope that the population may rebound if effective actions are taken to reduce the number of collisions with ships and entanglements with fishing gear are effective (NMFS 2004). The designation of critical habitat is a means to minimize these activities in areas where North Atlantic right whales are frequently present.

Designated critical habitat, which is the core of the calving ground and essential to the conservation of this species, is shown in Figure 2-2. Critical habitat was designated in 1994 for the coastal areas of southern Georgia and northern Florida from shore out to 15 nmi offshore from the mouth of the Altamaha River, Georgia, to Jacksonville, Florida, and then from shore out 5 nmi offshore from Jacksonville to approximately Sebastian Inlet, Florida (NMFS 1994). Revision of the existing critical habitats has been under study for several years. NMFS is evaluating potential critical habitat areas along the entire Atlantic seaboard from Maine through Florida. The agency anticipates publishing the findings/rulemaking in mid-summer 2012.

As shown in Figure 2-3, based on annual surveys from December through March 1985 to 2007, North Atlantic right whales are relatively common within the vicinity of the alternative sites, the area that would be transited between the dredge project area and the ODMDS, and near the federal navigation channel (Zani et al. 2006, 2008; DoN 2007c; Right Whale Consortium 2007). Coastal waters of Florida were identified as one of five “high use” areas in the revised NMFS recovery plan (NMFS 2004a). Figure 2-4 shows documented strandings of right whales in the vicinity of the project area between 1991 and 2006. Figure 2-5 shows right whale sightings in the region of the project area from surveys conducted from 2008 to 2009 (FWRI 2009). The eastern portion of the federal navigation channel and the three alternative sites are within North Atlantic right whale critical habitat.

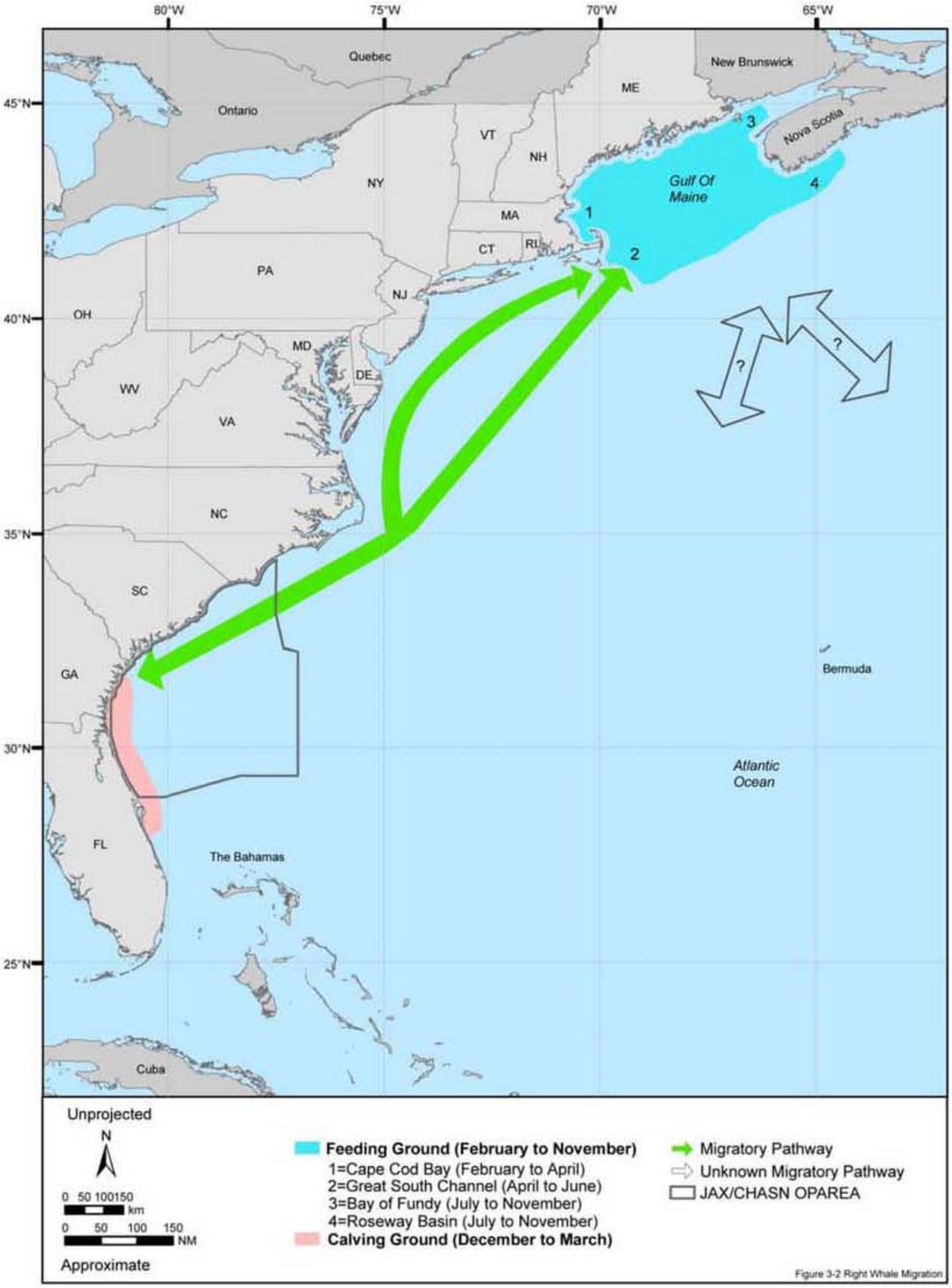


Figure 2-1. North Atlantic Right Whale Migration Patterns

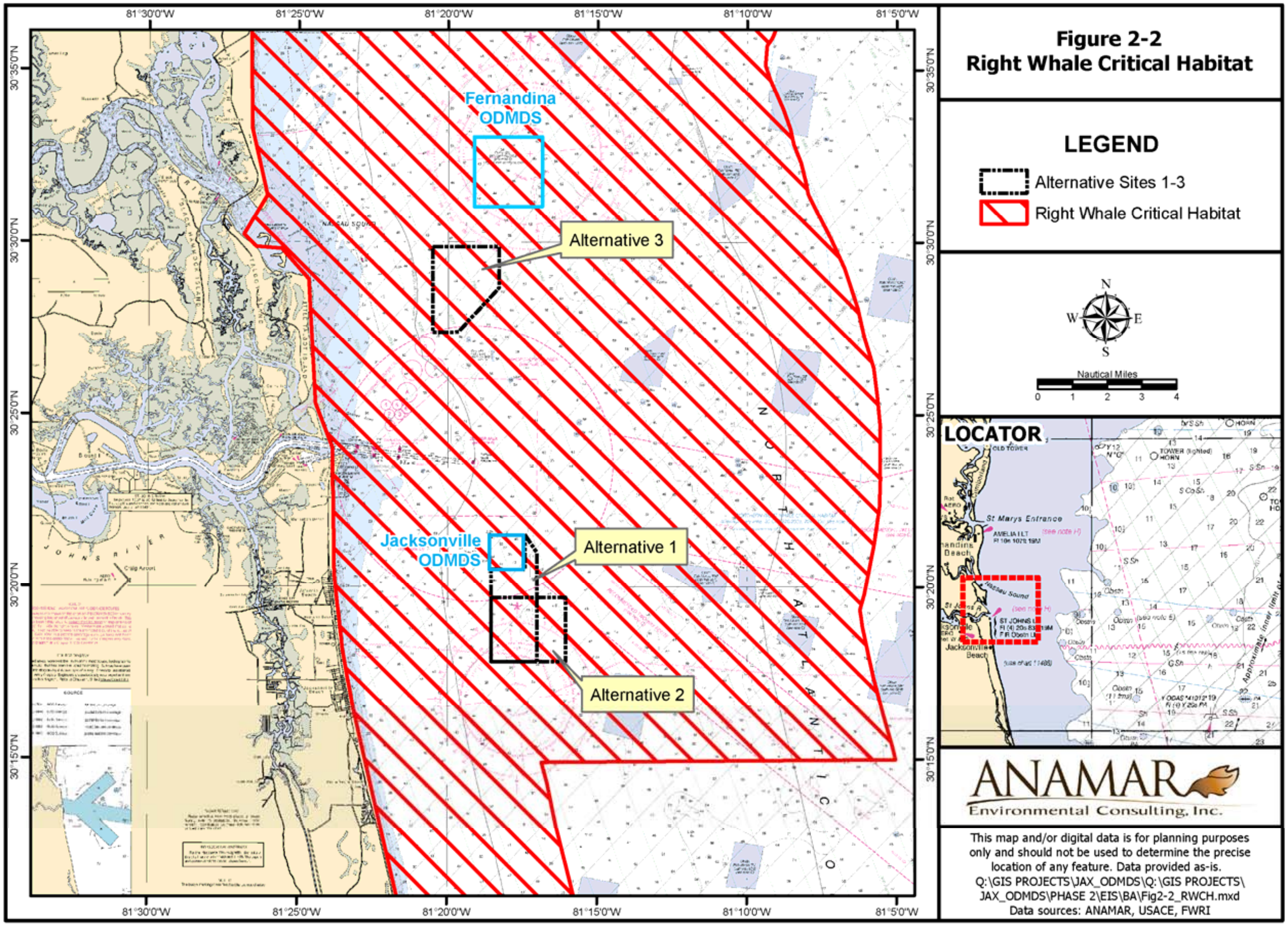


Figure 2-2
Right Whale Critical Habitat
LEGEND
Alternative Sites 1-3
Right Whale Critical Habitat
Nautical Miles
0 1 2 3 4
LOCATOR
Fernandina ODMDS
Jacksonville ODMDS
Alternative 1
Alternative 2
Alternative 3
81°30'0"W
81°25'0"W
81°20'0"W
81°15'0"W
81°10'0"W
81°5'0"W
30°35'0"N
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ANAMAR Environmental Consulting, Inc.
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Data sources: ANAMAR, USACE, FWRI

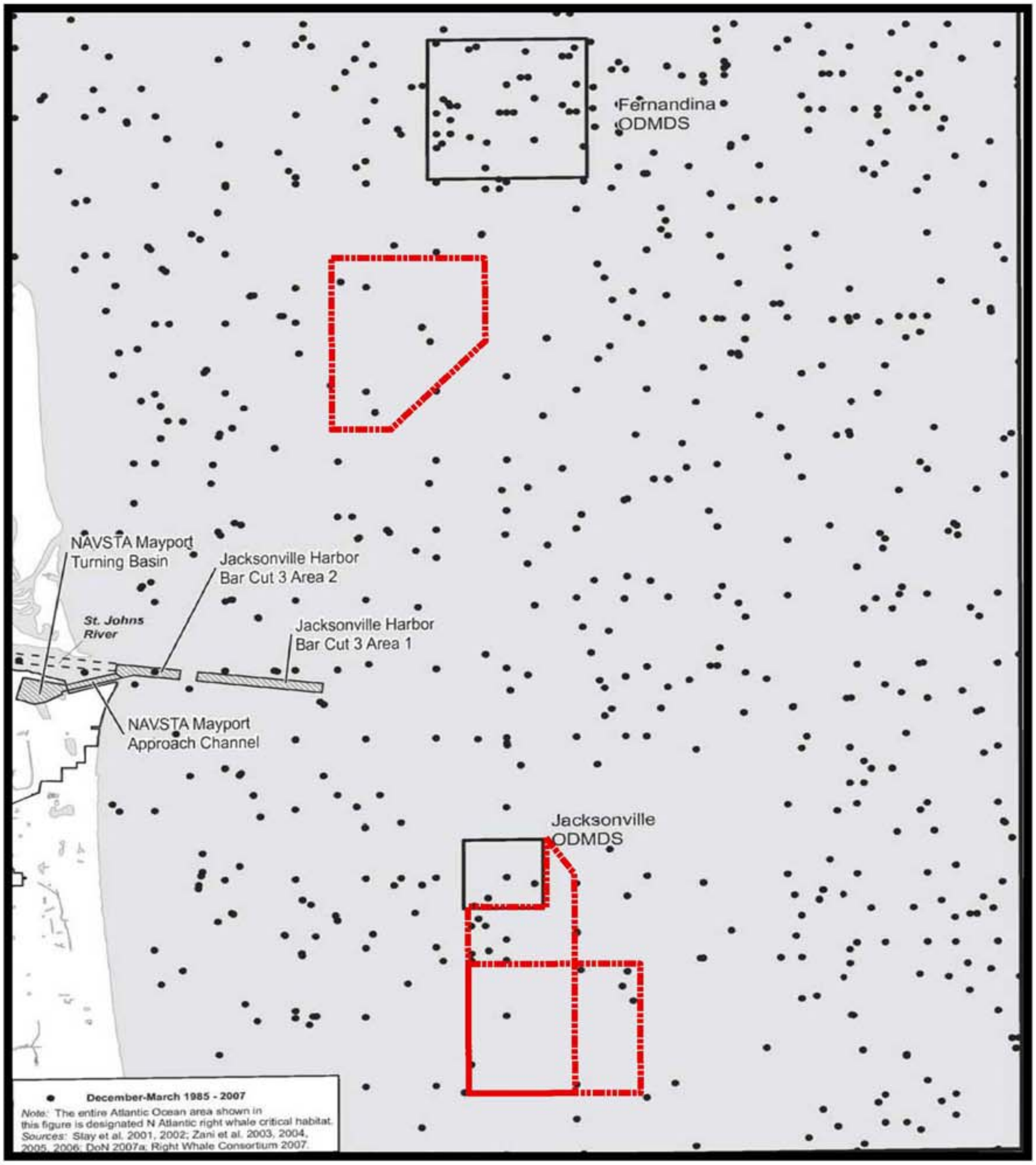

Figure 2-3. North Atlantic Right Whale Occurrences within the Region of Interest

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Data provided as-is. Q:\GIS PROJECTS\JAX_ODMDS\PHASE 2\EIS\MAPS UPDATED 031511\Figure 3.3-5 North Atlantic Right Whale Occur.mxd

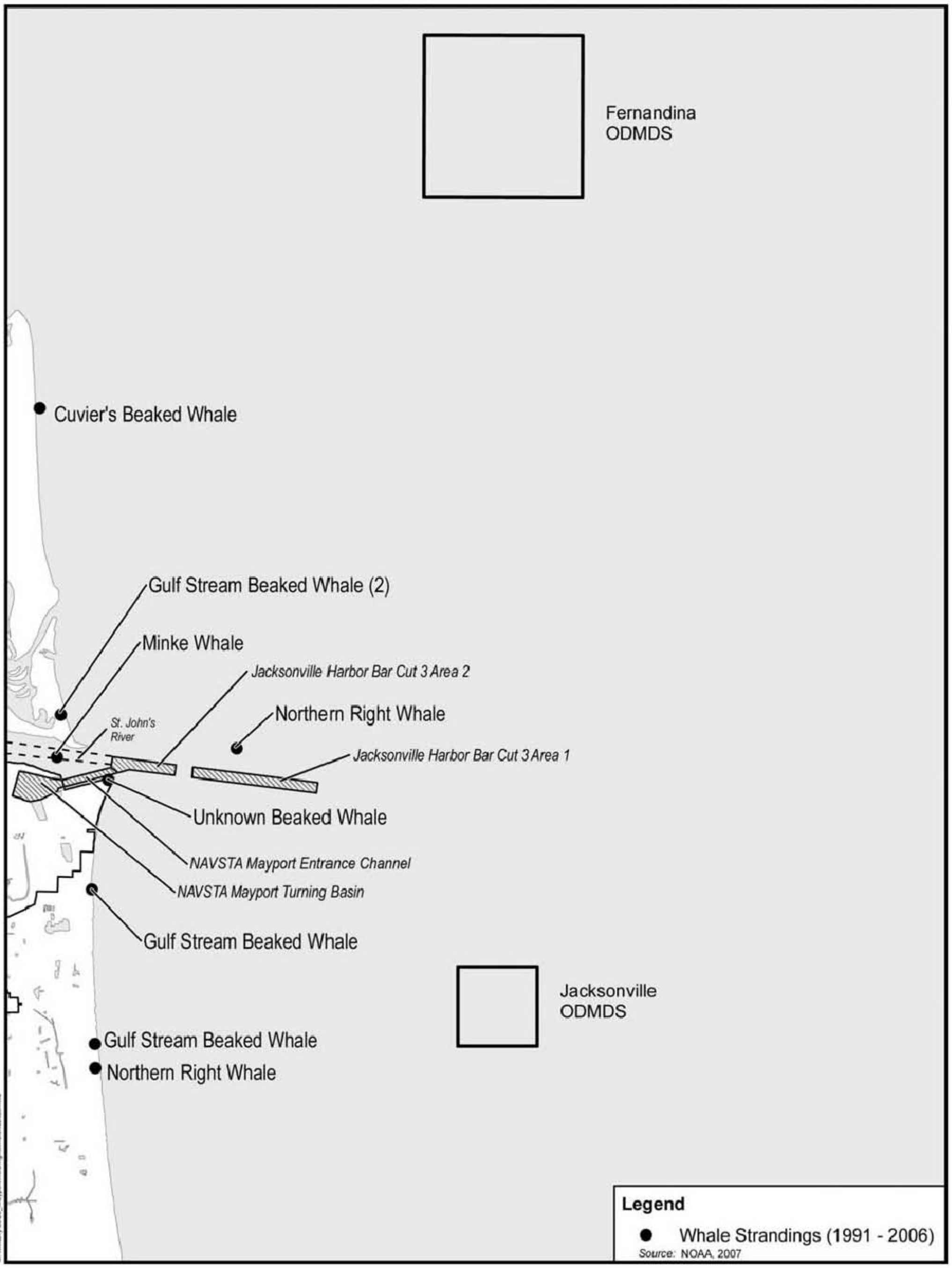

Figure 2-4. Whale Strandings within the Project Area (1991-2006)

This map and/or digital data is for planning purposes only and should not be used to determine the precise location of any feature.
Data provided as-is. Q:\GIS PROJECTS\JAX_ODMDS\PHASE 2\EIS\BIOLOGICAL ASSESSMENT\Right Whale\Figure 4-4_Whale Strandings_1991-2006.mxd

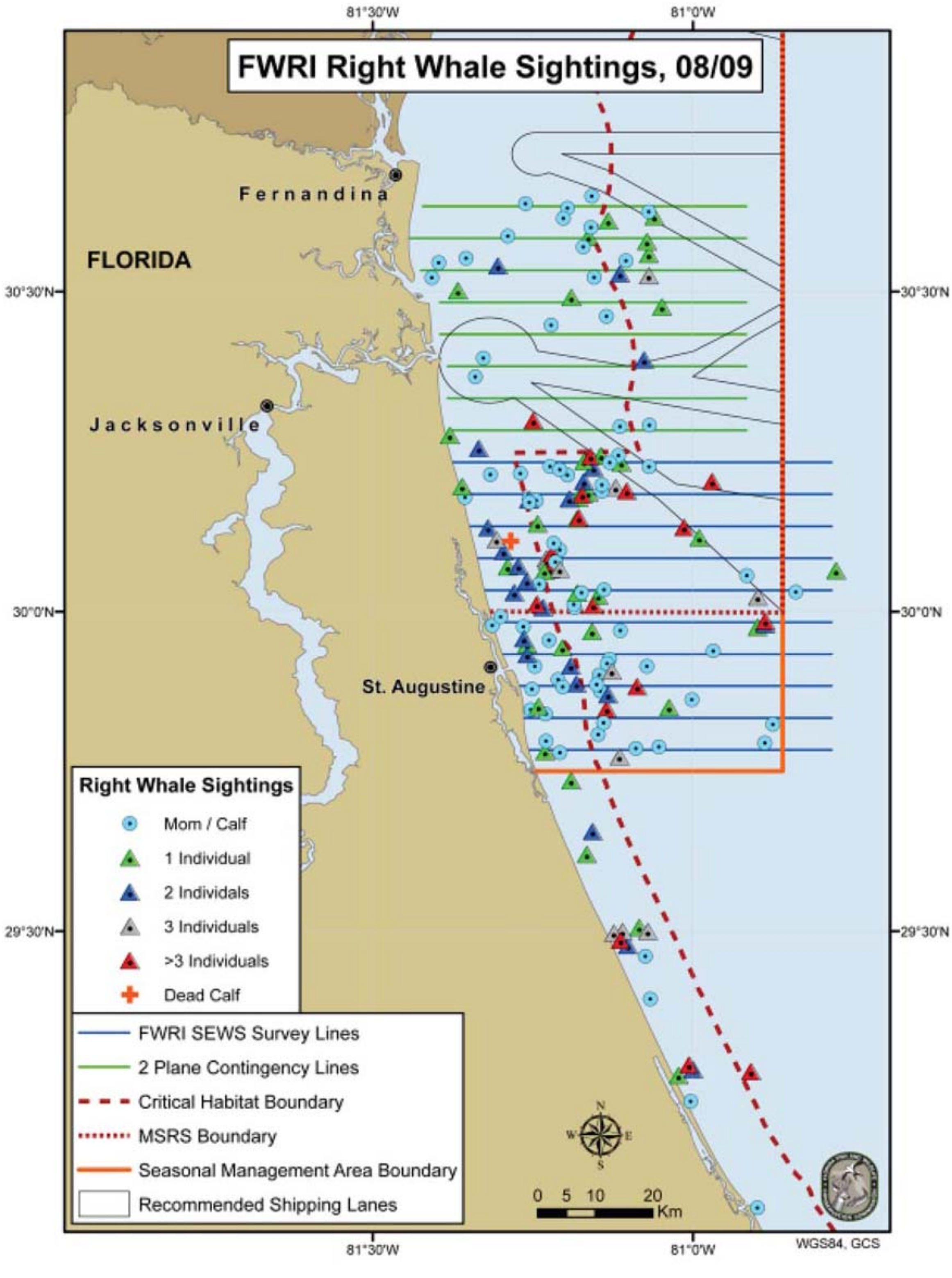

Figure 2-5. FWRI Right Whale Sightings 2008-2009

2.2.2. Humpback Whale

Humpback whales are found in all of the world's oceans and were listed as endangered in 1973. In general, summers are spent at high-latitude feeding grounds from southern New England to Norway, and migration during the winter is to the West Indies, over shallow banks and along continental coasts, where calving occurs. Most humpback whale sightings are in nearshore and continental shelf waters; however, humpback whales frequently travel across deep water during migration. Calving peaks from January through March, but some animals have been documented arriving as early as December, and a few not leaving until June. Strandings occur each year, for which over 50% of the animals exhibit scarring or fresh wounds due to fishing gear entanglement or boat collisions (DoN 2002).

Since humpback whales migrate south to calving grounds during the fall and make return migrations to the northern feeding grounds in spring, they are not expected off the coast of Florida during the summer, when they will be at their northern feeding grounds. The coastal region of Florida is not designated as an area of concentrated occurrence for this species (DoN 2002). Humpback whales have been spotted in the St. Johns River as recently as 2003. However, the habitat in the action area is not ideal for foraging or breeding humpback whales, but would serve as a migration corridor to feeding and breeding grounds. Based on sightings, strandings, and life history characteristics, humpbacks are expected to occur occasionally within the offshore areas near the alternative sites during fall, winter, and spring (DoN 2002).

2.3. Fish

2.3.1. Shortnose Sturgeon

Historical distribution for shortnose sturgeon has been in major rivers along the Atlantic seaboard, with the northern limit near the St. John River in Canada and the southern limit near the Indian River in central Florida (NAVFAC 2008). This species is known to spawn in freshwater rivers and feed and overwinter in freshwater and marine habitats, although occurrence in the marine environment is less common. Adults are generally thought to be estuarine anadromous in southern rivers. Shortnose sturgeon were listed as an endangered species in 1967 and remained listed with the passing of the ESA of 1972. A recovery plan was completed for shortnose sturgeon in hopes to de-list and recover populations depleted by habitat loss, fishing, and incidental fisheries bycatch. Currently 19 populations of shortnose sturgeon have been identified throughout their distribution areas, and the only viable population south of Cape Hatteras, North Carolina, resides in the Altamaha River. Population dynamics information is virtually nonexistent for most southern populations due to the small number of individuals recorded in surveys. Shortnose sturgeon feed on crustaceans, insect larvae, worms, and mollusks (NMFS 1998).

Beginning in spring 2001, the Florida Fish and Wildlife Research Institute (FWRI) and the USFWS began research on the population status and distribution of the species in the St. Johns River. After approximately 4,492 hours of gill-net sampling from January through August of 2002 and 2003 in the upper river and estuarine area, only one shortnose sturgeon was captured. In addition, after 21,381 hours of gill-net sampling for other species from 1980 through 1993, there were no incidental captures of sturgeon. Shortnose sturgeon are known to use warm-water springs in other southern rivers, but only eight individual fish have been observed in the numerous warm-water springs found upstream in the St. Johns River system, and these sightings occurred in the 1970s and early 1980s. FWRI concluded that with the lack of current sightings in surveys, the patchy and extremely infrequent catch of small individuals, and the historic low numbers, it is highly unlikely that a significant population of shortnose sturgeon currently resides within the St. Johns River (FWRI 2007e). Because the St. Johns River is heavily industrialized and has been for many years, shortnose sturgeon populations may have suffered due to habitat degradation and blocked access to historic spawning grounds in the upstream reaches of the river. Spawning habitat for this species is rock or gravel substrate near limestone outcroppings, which is very rare in the St. Johns River and associated tributaries. Reproduction of shortnose sturgeon has not been documented in the St. Johns River, and no large adults (>10 pounds) have been sighted in this area (FWRI 2007e). Due to the limited catch of shortnose sturgeon in the vicinity of the St. Johns River, their occurrence within the entrance channel and the offshore areas near the alternative sites is unlikely.

2.3.2. Smalltooth Sawfish

The historic range of smalltooth sawfish in the Atlantic Ocean and Gulf of Mexico was from Texas to Cape Hatteras, North Carolina, with a large number of occurrences in Florida (NAVFAC 2008). This elasmobranch species requires warm water and is rarely found north of southern Florida during winter months. Juveniles inhabit exclusively nearshore habitats such as mangroves, river mouths, and coastal bay waters, while adults populate similar nearshore habitats in addition to offshore waters. Smalltooth sawfish was listed as endangered in 2003 (NMFS 2003b). The loss and degradation of juvenile and adult habitat and the concurrent high incidence of fisheries bycatch for adults are the likely causes of decline. Current distribution is reduced by as much as 95%, with regular occurrences of the species restricted to the southern tip of Florida from the Caloosahatchee River to the Florida Keys. Smalltooth sawfish are late to mature, slow-growing, and produce small numbers of young (NMFS 2006b).

The area of occurrence for smalltooth sawfish includes a variety of nearshore habitats. The action area includes nearshore habitat areas, but smalltooth sawfish have not been sighted regularly in the area, or in any area of northern Florida, since the 1800s. The majority of sightings in northern Florida have been large individuals, thought to be part of southern populations transiting through the area. There has been only one confirmed sighting of this species in northern Florida during winter months. The NMFS draft recovery plan states a need for this species to repopulate the coast of Florida, but due to its location in regards to the current southern distribution of this species, the action area (Northern Florida) is not one of the main areas to be repopulated (NMFS 2006b). Due to its sporadic and rare occurrence anywhere north of southern Florida, it is considered very unlikely that smalltooth sawfish would occur within the project area.

2.3.3. Atlantic Sturgeon

The Atlantic sturgeon is included because this species is proposed to be listed as endangered during the course of this EIS/ National Environmental Policy Act (NEPA) process. Federal agencies and the public are encouraged to consider this species during project planning.

The historic range of the Atlantic sturgeon is from St. Croix, Maine, to the St. Johns River, Florida. They spend most of their lives in marine waters and migrate up rivers from February through March to spawn. Threats from dredging, water quality, and commercial bycatch likely contribute to the population decline of this species. Due to habitat degradation, the St. Johns River is suspected to serve as only a nursery for existing Atlantic sturgeon that still utilize the waterway system (NMFS and USFWS 1998). The St. Johns River is not currently used for spawning, and historical use of the river is unknown (ASSRT 2007). Therefore, it is unlikely that the Atlantic sturgeon will inhabit the waters within the entrance channel and federal navigation channel. However, because the Atlantic sturgeon spends a majority of its life in marine waters, this species may be present in the offshore areas in the vicinity of the alternative sites and in the transit areas between dredge project areas and the ODMDS (Figure 2-6).

A large U.S. commercial fishery (100,000 to 250,000 lbs/year) existed for the Atlantic sturgeon from the 1950s through the mid-1990s; the origin of the fishery dates back to colonial times (NMFS 2009). The Atlantic sturgeon is managed under a Fishery Management Plan implemented by the Atlantic States Marine Fisheries Commission (ASMFC), which implemented a coast-wide moratorium on the harvest of wild Atlantic sturgeon in late 1997/early 1998. NMFS followed this with a similar moratorium for federal waters. The status has been periodically reviewed since being identified as a candidate species for listing under the ESA in 1991 (NMFS 2010). In 2007, a Status Review Team (SRT) consisting of biologists from NMFS, U.S. Geological Survey (USGS), and USFWS completed a status review report on Atlantic sturgeon in the United States. The report was reviewed and supplemented by eight state and regional experts who provided their individual expert opinions on the scientific facts contained in the report and provided additional information to ensure the report provided the best available data. Lastly, the report was peer-reviewed by six academic experts. NMFS evaluated the status review report and all other best available information to determine if listing Atlantic sturgeon under the ESA as either threatened or endangered was warranted. The SRT recommended that Atlantic sturgeon in the United States be divided into the following five DPSs: Gulf of Maine; New York Bight; Chesapeake Bay; Carolina; and South Atlantic. After reviewing the available information on the Carolina and South Atlantic DPSs (the two DPSs located within the NMFS Southeast Region), NMFS determined that listing these two DPSs as endangered was warranted, and in October 2010 proposed to list them as endangered under the ESA (NMFS 2010).

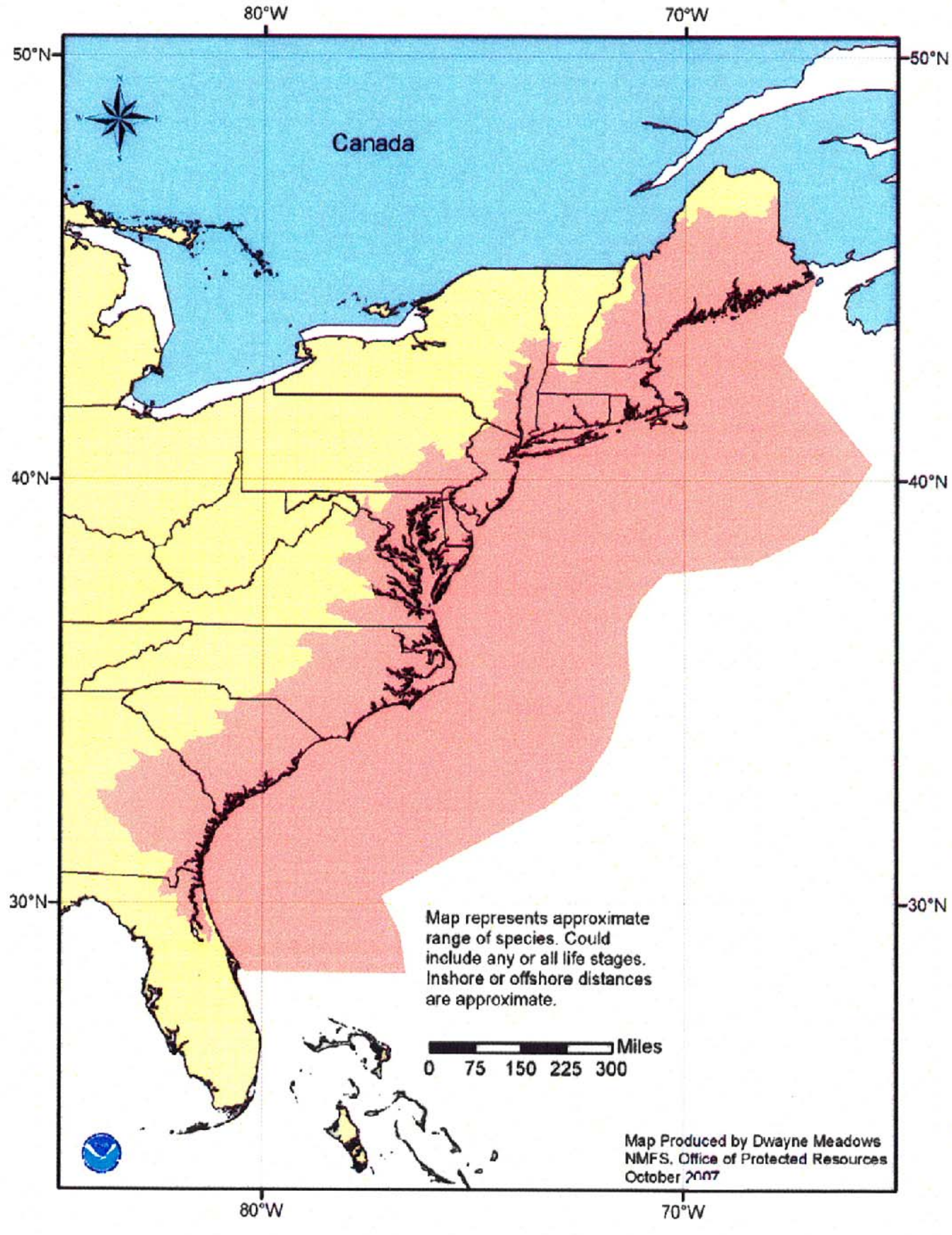

Figure 2-6. Range of the Atlantic Sturgeon

This map and/or digital data is for planning purposes only and should not be used to determine the precise location of any feature. Data provided as-is.
Q:\GIS PROJECTS\JAX_ODMDS\PHASE 2\EIS\BIOLOGICAL ASSESSMENT\Range of Atlantic Sturgeon.mxd. Data source: NMFS.

3. EFFECTS OF PROPOSED ACTION

This section presents an analysis of potential direct and indirect effects on ESA-listed species as a result of the proposed action. Potential activities that may affect ESA-listed species include in-water disturbances such as movement by surface support vessels and dredged material disposal operations. Direct effects would be associated with physical encounters of surface vessels with a listed species and effects of disposed material in the water column and benthic environments. Indirect effects typically result from ancillary activities that are influenced by disposal activities or their direct effects that occur later in time and that are reasonably certain to occur (e.g., attraction of predators due to development and human presence). All direct and indirect project effects on listed species have been further classified and evaluated based on their anticipated longevity (i.e., temporary or permanent effects). Table 3-1 provides a summary of the potential direct and indirect effects on ESA-listed species with implementation of the proposed action.

Table 3-1. Summary of the Potential Direct and Indirect Effects on ESA-Listed Species

	Direct Effects		Indirect Effects	
Species	**Temporary**	**Permanent**	**Temporary**	**Permanent**
FISH				
Shortnose sturgeon	No	No	No	No
Atlantic sturgeon	No	No	No	No
Smalltooth sawfish	No	No	No	No
SEA TURTLES				
Loggerhead	Yes	No	No	No
Leatherback	Yes	No	No	No
Kemp's ridley	Yes	No	No	No
Green	Yes	No	No	No
MARINE MAMMALS				
North Atlantic right whale	Yes	No	No	No
Humpback whale	Yes	No	No	No

As they relate to the ESA-listed species and critical habitat considered in this BA, direct and indirect effects from proposed activities within the action area have been evaluated based upon (1) an understanding of the methods and equipment that would be used during dredge material disposal operations, (2) knowledge of the potential for such methods and equipment to disturb the natural resources on which the subject species depend, and (3) awareness of the types of effects that have resulted from similar actions in the past.

The use of surface support vessels during the disposal activities to the proposed ODMDS would not significantly change the airborne or underwater noise environment within the action areas. The alternative sites are currently transited regularly by numerous commercial and recreational vessels, recreational boaters, and other surface vessels (e.g., freighters). Therefore, the potential effects of airborne or underwater noise from surface vessels on listed species are not discussed further.

3.1. Sea Turtles

Sea turtles are at risk from collisions with vessels since they spend time breathing and sunning on the surface of the water. Little information is available on the types of vessels responsible for turtle deaths or injury, although the focus has tended to be on recreational boat traffic (National Research Council 1990). Surface vessels would transit to and from the ODMDS to dispose of dredged materials, and heightened vessel activity may lead to collisions between vessels and sea turtles. The dredge contractors would adopt avoidance and minimization measures to reduce the potential for collisions with sea turtles at the surface. Vessels associated with the transport of dredged material to the ODMDS are expected to implement actions, where feasible, to avoid interactions with sea turtles, including maneuvering away from the animal or slowing the vessel. However, during poor sighting conditions (i.e., fog, high sea state, darkness), detecting sea turtles can be difficult and there is higher potential for a vessel strike. Nevertheless, the potential for a collision between a vessel and a sea turtle is expected to be unlikely due to the type and nature of the proposed activities within the action area.

Disposal activities at the ODMDS can potentially reduce food availability by burying and altering the benthic habitat and creating temporary increases in turbidity. The effect of increased turbidity on sea turtles is expected to be minimal due to the short duration of the reduced water clarity. The effects of burial on benthic infauna could be persistent within the boundaries of the ODMDS since disposal operations repeatedly impact the same area, potentially making it difficult for benthic infauna to fully recover within the disposal footprint or altering species composition. However, the 4-nmi^2 ODMDS represents only a small portion of this type of benthic habitat available in the region, and only a small portion of the ODMDS would be impacted during each disposal event.

Significant effects on sea turtles are not expected due to disposal activities; therefore, the proposed action is not likely to adversely affect sea turtles.

3.2. Marine Mammals

The following section discusses the potential effects of the proposed action on North Atlantic right whales and humpback whales within the project area. As effects in the marine environment are similar for the two whale species in the assessment, the analysis will be combined for both species. Dredged material disposal activities and their potential effects on listed whale species are addressed. The primary concern is an increase in the level of surface vessel activity in the action area (NAVFAC 2008).

Disturbance from ships transiting through the area would not be significantly different from normal vessel operations that occur daily in the project area, although during dredging activities there would be an increase in vessel activity in the area between the river entrance and the proposed ODMDS. Impacts from disposal operations are expected to be consistent with previous findings by NMFS (NMFS 1991, 1995). Since these consultations were completed, (1) the estimated number of North Atlantic right whales has increased based on the data presented in the NMFS annual stock assessments and the numbers of North Atlantic right whales reported by the New England Aquarium in their annual "Right Whale Report Card"; (2) implementation of the early warning system (EWS) associated with operations near or within the calving grounds has been solidified by Memorandum of Agreement and has been in place since 1989; and (3) USACE's involvement with and awareness of North Atlantic right whale issues has increased significantly. Based on these factors, USACE expects that disposal operations will have a minimal effect on North Atlantic right whales. There would be no permanent or indirect effects associated with the proposed action.

Critical habitat analysis of the potential effects of the proposed action on North Atlantic right whale critical habitat was based on an analysis of the impacts on the habitat itself and those elements that make up habitat. The actual physical habitat located outside the St. Johns River channel is part of the designated North Atlantic right whale critical habitat, and no alteration to this portion of critical habitat would occur. The alternatives are located in North Atlantic right whale critical habitat, but dredged materials would settle out to the benthos, which is not considered part of the critical habitat. Dredged materials would travel through the water column and would result in localized, short-term changes in the water column as sediments settle on the seafloor. Because of the low-level releases, dilution, and the transient natures of water masses, adverse effects to water quality should be local and short-term and should have minimal effect on the region (USEPA 1983). Based upon the current analysis of potential effects on designated critical habitat, implementation of the proposed action within the project area would not compromise the function or relevance of any habitat indicators or critical habitat elements. The proposed action would not increase fragmentation of the North Atlantic right whale population nor decrease the function of any calving areas. Therefore, implementation of the proposed action would not destroy or adversely modify North Atlantic right whale critical habitat.

3.3. Fish

3.3.1. Shortnose and Atlantic Sturgeon

FWRI concluded that with the lack of current sightings in surveys, the patchy and extremely infrequent catch of small individuals, and the historic low numbers, it is highly unlikely that significant populations of shortnose or Atlantic sturgeon currently reside within the St. Johns River. The proposed ODMDS will be located several miles offshore the mouth of the St. Johns River, and though some individuals may be present in the marine waters in the area of alternative sites, shortnose and Atlantic sturgeon are not likely to be adversely affected by the proposed action.

3.3.2. Smalltooth Sawfish

Encounter data indicate that smalltooth sawfish can be found with some regularity only in south Florida from Charlotte Harbor to Florida Bay. A limited number of reported encounters (one each in Georgia, Alabama, Louisiana, and Texas) have occurred outside of Florida since 1998. Peninsular Florida is the main U.S. region that historically and currently hosts the species year-round because the region provides the appropriate climate (subtropical to tropical) and contains the habitat types (lagoons, bays, mangroves, and nearshore reefs) suitable for the species. Encounter data and research efforts indicate that a resident, reproducing population of smalltooth sawfish exists only in southwest Florida (Simpfendorfer and Wiley 2005).

Smalltooth sawfish have not been sighted in the action area. The closest sawfish encounter documented in Mote Marine Laboratory's Sawfish Encounter Database (1999-2006) was near St. Augustine in the Atlantic Ocean (Simpfendorfer and Wiley 2006). In the unlikely event a sawfish is present in the project area, sawfish should not be affected by the vessels transiting to the ODMDS because they advance at a slow pace and are noisy; giving mobile sawfish the opportunity to get out of the way (no sawfish take by a dredge has ever been reported to NMFS). Additionally, prey items (e.g., fish and crustaceans) are not limiting in Florida's east coast waters and, since mangroves are not affected, it is unlikely that foraging habitats for smalltooth sawfish will be affected. Therefore, smalltooth sawfish are not likely to be adversely affected by the proposed action.

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4. MEASURES TO AVOID, MINIMIZE, AND COMPENSATE FOR EFFECTS

4.1. Sea Turtles

USACE will comply with applicable windows and protective measures for protection of sea turtles as stated in the most current Biological Opinion.

In general, to minimize the potential for collisions, vessels transporting dredged materials to the ODMDS are expected to implement protective measures, where feasible, to avoid interactions with sea turtles, including maneuvering away from the animal or slowing the vessel, particularly during poor sighting conditions (i.e., fog, high sea state, darkness). During transport of dredged material to the ODMDS and when returning to the dredging site, vessels would use caution and proceed at a speed such that the vessel can safely take proper and effective action to avoid a potential collision with a sea turtle; this preventative action would significantly reduce the potential for a vessel strike with a sea turtle. Any collision with and/or injury to a sea turtle shall be reported immediately to the NMFS's Protected Resources Division and the local authorized sea turtle stranding/rescue organization.

Despite these precautions, turtles may prove very difficult to spot from a moving vessel when they are resting below the water surface, during nighttime, and during periods of inclement weather. It is assumed, however, that a collision between a sea turtle and moving vessel is unlikely. Adult, subadult, and perhaps juvenile turtles are capable of avoiding moving dredge-related vessels, especially when the vessels operate within these limited areas at slow to relatively slow speeds. Impacts from collisions are, consequently, not likely to adversely affect marine turtle populations within the project area.

4.2. Marine Mammals

To minimize project impacts on right whales and other marine mammals related to transporting dredged material to the new ODMDS, USACE will comply with the terms and conditions of the most recent Biological Opinion.

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5. CUMULATIVE EFFECTS ANALYSIS

The Council on Environmental Quality's (CEQ) regulations (40 CFR §§ 1500-1508) implementing the procedural provisions of the NEPA of 1969, as amended (42 U.S.C. §§ 4321 et seq.), define *cumulative effects* as

> *The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR § 1508.7).*

Similar and unrelated actions occurring in the vicinity of the action area include navigation channel maintenance, commercial and recreational fishing, sand borrow areas, and shipping traffic. Past projects include the designation of the existing Jacksonville ODMDS and Fernandina Beach ODMDS, including their ongoing use. Current projects include the maintenance of the Jacksonville Harbor Federal Navigation entrance channel and the Naval Station Mayport entrance channel and turning basin. Reasonably foreseeable future actions include the Naval Station Mayport and Jacksonville Harbor Deepening projects and the designation and use of sand borrow areas.

The designation of an expanded or new ODMDS is not expected to introduce new human activities in the project vicinity. Commercial shipping and recreational and commercial fishing are expected to continue. Increased vessel traffic associated with the implementation of the Naval Station Mayport and Jacksonville Harbor Deepening Projects may lead to an increased risk of animal collisions with vessels transiting to and from the ODMDS during initial construction; however, observance of critical habitat guidelines and the North Atlantic right whale EWS would mitigate for this potential increase. The increased vessel traffic associated with these projects may also affect water quality at a greater frequency than existing circumstances. These effects are expected to be temporary.

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6. CONCLUSION

Table 6-1 summarizes the determination of effects on listed species and critical habitat as presented in the previous sections from implementation of the proposed action.

Table 6-1. Summary of Effects on Listed Species and Critical Habitat

Species	ESA Status	Effects Determination
FISH		
Shortnose sturgeon	Endangered	Not likely to adversely affect
Atlantic sturgeon	Proposed Endangered	Not likely to adversely affect
Smalltooth sawfish	Endangered	Not likely to adversely affect
SEA TURTLES		
Loggerhead	Threatened	May affect, not likely to adversely affect
Leatherback	Endangered	May affect, not likely to adversely affect
Kemp's Ridley	Endangered	May affect, not likely to adversely affect
Green	Endangered	May affect, not likely to adversely affect
MARINE MAMMALS		
North Atlantic right whale	Endangered*	May affect, not likely to adversely affect
Humpback whale	Endangered	May affect, not likely to adversely affect

* Critical habitat designated in the area of the Proposed Action

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7. LITERATURE CITED

ANAMAR. 2010. Final Report and Addendum to Final Report – Jacksonville ODMDS Reconnaissance Sidescan Sonar Survey. Submitted to U.S. Army Corps of Engineers, Jacksonville District, Jacksonville, Florida. August 2010.

Atlantic Sturgeon Status Review Team (ASSRT). 2007. Status Review of Atlantic Sturgeon *(Acipenser oxyrinchus oxyrinchus)*. Report to National Marine Fisheries Service.

Conley, W.J. and B.A. Hoffman. 1987. Nesting Activity of Sea Turtles in Florida, 1979-1985. Florida Scientist 50:201-210.

DoN (Department of the Navy). 2002. Marine Resource Assessment for the Charleston/Jacksonville Operating Area. Final Report. Naval Facilities Engineering Command, Norfolk, VA. August.

DoN. 2007a. Final Integrated Natural Resources Management Plan for Naval Station Mayport, Mayport, Florida. October.

DoN. 2007b. Notice of Intent to Prepare an Environmental Impact Statement/Overseas Environmental Impact Statement for Navy Atlantic Fleet Training in the Navy Cherry Point Range Complex and Notice of Public Scoping Meetings. Federal Register 72:21248-21249.

DoN. 2007c. Notice of Intent to Prepare an Environmental Impact Statement/Overseas Environmental Impact Statement for Navy Atlantic Fleet Training in the Jacksonville Range Complex and Notice of Public Scoping Meetings. Federal Register 72:3806-3807.

DoN. 2008. Marine Resources Assessment Update for the Charleston/Jacksonville Operation Area Final Report.

Eckert, K.L. 1995. Leatherback Sea Turtle, *Dermochelys coriacea*. National Marine Fisheries Service and FWS status reviews for sea turtles listed under ESA 1973. P.T. Plotkin, editor. NMFS, Silver Spring, MD.

Eckert, S.A. and K.L. Eckert, P. Ponganis, and G.L. Kooyman. 1989. Diving and Foraging Behavior of Leatherback Sea Turtles (*Dermochelys coriacea*). Canadian Journal of Zoology 67:2834-2840.

FWRI (Florida Wildlife Research Institute). 2007a. Statewide Nesting Beach Survey Program Loggerhead (Caretta caretta) Nesting Data, 1990-2006. *http://myfwc.com/research/wildlife/sea-turtles/nesting/beach-survey-totals/*

FWRI. 2007b. Reported Nesting Activity of the Kemp's Ridley, *Lepidochelys kempii*, in Florida, 1979-2006; Data Summary Date: 11 May 2007.

FWRI. 2007c. Statewide Nesting Beach Survey Program Green Turtle (*Chelonia mydas*) Nesting Data, 1990-2006.

FWRI. 2007d. Statewide Nesting Beach Survey Program Leatherback (*Dermochelys coriacea*) Nesting Data, 1990-2006.

FWRI. 2007e. Shortnose Sturgeon Population Evaluation in the St. Johns River, Florida. *http://myfwc.com/research/saltwater/sturgeon/research/population-evaluation/*

FWRI. 2009. Right Whales Research Activities. *http://research.myfwc.com/images/articles/18051/r_right_whales.pdf*

FWRI. 2011. Sea turtle nesting data retrieved from http://myfwc.com/research/wildlife/sea-turtles/nesting/statewide/. *Accessed 2/27/12.*

Jensen, A.S. and G.K. Silber. 2004. NMFS Large Whale Ship Strike Database. NOAA Technical Memorandum NMFS-OPR-25. January.

NARWC (North Atlantic Right Whale Consortium). 2007. North Atlantic Right Whale Consortium Sightings Database. New England Aquarium, Boston, MA. 31 July.

NARWC. 2011. *North Atlantic Right Whale Annual Report Card, November 2011* [online publication]. Accessed 02/27/12.

National Research Council. 1990. Decline of the Sea Turtles: Causes and Prevention. National Academy Press, Washington, DC.

NAVFAC. 2008. Final Environmental Impact Statement for the Proposed Homeporting of Additional Surface Ships at Naval Station Mayport, Florida. November 2008.

NMFS (National Marine Fisheries Service). 1978. Listing and Protecting Loggerhead Sea Turtles as “Threatened Species” and Populations of Green and Olive Ridley Sea Turtles as Threatened Species or “Endangered Species”. Federal Register 43:32800-32811.

NMFS. 1991. Recovery Plan for the Humpback Whale (*Megaptera novaeangliae*). Silver Spring, Maryland: National Marine Fisheries Service.

NMFS. 1994. Critical Habitat for Northern Right Whale (*Eubalaena glacialis*). Federal Register 59:28805-28835.

NMFS. 1995. Regional Biological Opinion for Hopper Dredging of Channels and Beach Nourishment Activities in the Southeastern United States from North Carolina through Florida East Coast. Office of Protected Resources, Silver Spring, MD and Southeast Regional Office, Jacksonville, FL. 25 August.

NMFS. 1998. Final Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for NMFS, Silver Spring, MD. December.

NMFS. 2003b. Endangered and Threatened Species; Final Endangered Status for a Distinct Population Segment of Smalltooth Sawfish (*Pristis pectinata*) in the United States. Federal Register 68:15674-15680.

NMFS. 2004. Recovery Plan for the North Atlantic Right Whale (*Eubalaena glacialis*). Silver Spring, MD. August.

NMFS. 2006a Review of the Status of the Right Whales in the North Atlantic and North Pacific Oceans. Silver Spring, MD. December.

NMFS. 2006b. Draft Recovery Plan for Smalltooth Sawfish (*Pristis pectinata*). Prepared by the Smalltooth Sawfish Recovery Team for NMFS, Silver Spring, MD. August.

NMFS. 2007b. National Marine Mammal Health and Stranding Response Database and the Southeast Region Marine Mammal Stranding Database for Duval, Nassau, and St. Johns Counties, Florida (1991-2006). Southeast Marine Mammal Stranding Network.

NMFS. 2010a. Species under the Endangered Species Act (ESA) *http://www.nmfs.noaa.gov/pr/species/esa/*

NMFS. 2010b. Endangered and Threatened Wildlife and Plants; Proposed Listings for Two Distinct Population Segments of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Southeast. 50 CFR Part 224. NOAA.

NMFS. 2010c. 50 CFR Part 224, Federal Register/Vol. 75, No. 193/Wednesday, October 6, 2010/Proposed Rules.

NMFS and USFWS (National Marine Fisheries Service and U.S. Fish and Wildlife Service). 1992a. Recovery Plan for Kemp's Ridley Sea Turtle (*Lepidochelys kempii*). Prepared by the Kemp's Ridley Recovery Team for USFWS, Southwest Region, Albuquerque, NM and NMFS, Washington, DC.

NMFS and USFWS. 1992b. Recovery Plan for Leatherback Turtles *Dermochelys coriacea* in the U.S. Caribbean, Atlantic, and Gulf of Mexico. NMFS, Washington, DC.

NMFS and USFWS. 1993. Recovery Plan U.S. Population of Loggerhead Turtle *Caretta caretta*. Prepared by the Loggerhead/Green Turtle Recovery Team for USFWS, Southeast Region, Atlanta, GA and NMFS, Washington, DC.

NMFS and USFWS. 1998. Status Review of the Atlantic Sturgeon. National Marine Fisheries Service and United States Fish and Wildlife Service, Washington, D.C.

NMFS and USFWS. 2007a. Loggerhead Sea Turtle (*Caretta caretta)*, 5-year Review: Summary and Evaluation. NMFS, Silver Spring, MD and USFWS, Jacksonville, FL. August.

NMFS and USFWS. 2007b. Kemp's Ridley Sea Turtle (*Lepidochelys kempii*), 5-Year Review: Summary and Evaluation. NMFS, Silver Spring, MD and USFWS, Jacksonville, FL. August.

NMFS and USFWS. 2007c. Green Sea Turtle (*Chelonia mydas*), 5-Year Review: Summary and Evaluation. NMFS, Silver Spring, MD and USFWS, Jacksonville, FL. August.

Simpfendorfer, Colin A. and Tonya R. Wiley. 2005. Final Report: National Smalltooth Sawfish Encounter Database. Center for Shark Research, Mote Marine Laboratory, Sarasota, FL.

Simpfendorfer, Colin A. and Tonya R. Wiley. 2006. Final Report: National Smalltooth Sawfish Encounter Database. Center for Shark Research, Mote Marine Laboratory, Sarasota, FL.

USACE (U.S. Army Corps of Engineers). 2008a. USACE Sea Turtle Data Warehouse: Data on Kemp's Ridley Sea Turtle Takes. http://el.erdc.usace.army.mil/seaturtles/species.cfm?Species=LK&Type=District&Code=SAJ.

USACE. 2008b. USACE Sea Turtle Data Warehouse: Data on Green Sea Turtle Takes. http://el.erdc.usace.army.mil/seaturtles/species.cfm?Species=CM&Type=District&Code=SAJ.

USEPA (U.S. Environmental Protection Agency). 1983. *Final Environmental Impact Statement for Jacksonville Harbor, Florida, Ocean Dredged Material Disposal Site Designation.* USEPA Criteria and Standards Division. Washington, D.C.

Zani, M.A., A.R. Knowlton, S.D. Kraus, K.M. Lagueux, and H.M. Pettis. 2006. Aerial Surveys to Reduce Ship/Whale Collisions in the Calving Ground of the North Atlantic Right Whale (*Eubalaena glacialis*). Annual report submitted to NOAA.

Zani, M.A., A.R. Knowlton, K.M. Lagueux, P. Hamilton, S.D. Kraus, and H.M. Pettis. 2008. Aerial Surveys to Reduce Ship/Whale Collisions in the Calving Ground of the North Atlantic Right Whale (Eubalaena glacialis). Annual Report submitted to NOAA.

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APPENDIX D

Essential Fish Habitat Assessment

Photo Courtesy of A. Bemis and J. Moore, FLMNH

Draft Environmental Impact Statement
for
Designation of an Ocean Dredged Material Disposal Site Offshore of Jacksonville, Florida

United States Environmental Protection Agency

U.S. EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303

DRAFT REPORT

ESSENTIAL FISH HABITAT ASSESSMENT FOR A NEW OCEAN DREDGED MATERIAL DISPOSAL SITE OFF JACKSONVILLE, FLORIDA

Contract No. W912EP-09-C-0058

Prepared for

U.S. Army Corps of Engineers
Jacksonville District
701 San Marco Boulevard
Jacksonville, Florida 32207-8175

Prepared by

ANAMAR Environmental Consulting, Inc.
2106 NW 67th Place, Suite 5
Gainesville, Florida 32608

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Cover page background image of a sea whip (*Leptogorgia* sp.) courtesy of Amanda Bemis and Jenna Moore, Florida Museum of Natural History

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ACRONYMS AND ABBREVIATIONS

ASMFC	Atlantic States Marine Fisheries Commission
cm	centimeter(s)
cy	cubic yards
EEZ	Exclusive Economic Zone (seaward edge of a state's territorial sea to 200 nautical miles beyond its coast)
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA/USEPA	U.S. Environmental Protection Agency
FTU	formazin turbidity units
FWC	Florida Fish and Wildlife Conservation Commission
HAPC	habitat areas of particular concern
kg	kilogram(s)
LPC	limiting permissible concentration
m, m^2	meter(s), square meter(s)
mm	millimeter(s)
MAFMC	Mid-Atlantic Fishery Management Council
MPRSA	Marine Protection, Research, and Sanctuaries Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NEFMC	New England Fishery Management Council
NMFS	National Marine Fisheries Service (= NOAA Fisheries)
nmi, nmi^2	nautical miles, square nautical miles
NOAA	National Oceanic and Atmospheric Administration
ODMDS	ocean dredged material disposal site
PAR	photosynthetically active radiation
PPT	parts per thousand
SAFMC	South Atlantic Fishery Management Council
SFA	Sustainable Fisheries Act (an amendment of the Magnuson Fishery Conservation and Management Act)
SL	standard length
SMMP	Site Management and Monitoring Plan
TL	total length
USACE	U.S. Army Corps of Engineers
USEPA/EPA	U.S. Environmental Protection Agency

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1 INTRODUCTION

1.1 Proposed Action

The U.S. Army Corps of Engineers Jacksonville District (USACE) has requested that the U.S. Environmental Protection Agency Region 4 (EPA) designate an additional ocean dredged material disposal site (ODMDS), approximately 4 square nautical miles (nmi^2) in size, offshore from the mouth of the St. Johns River for the disposal of dredged material primarily from the Jacksonville Harbor Federal Navigation Project and from Naval Station Mayport. The purpose of the proposed action is to ensure that adequate environmentally acceptable and economically and logistically feasible ocean disposal site capacity is available for the next 50 years for suitable dredged material generated from new projects and maintenance dredging in the vicinity of Duval County, Florida. The availability of suitable ocean disposal sites to support ongoing maintenance and capital improvement projects is essential for the continued use and economic growth of vital commercial and recreational areas in the region. As part of the site designation process, initial screening of alternative sites based on environmental, operational, and economic criteria were conducted to identify viable dredged material disposal sites for further evaluation. An environmental impact statement (EIS) has been prepared for USACE and EPA to evaluate the feasibility for designation of a new ODMDS offshore of Jacksonville, Florida, to meet current and future dredged material disposal needs.

The need to expand or create a new ODMDS is based on observed mounding of the current site, future capacity modeling of both the ODMDS and upland confined disposal facilities, historical dredging volumes, and estimates of future proposed projects. Based on this information, it is estimated that the Jacksonville ODMDS could reach capacity as early as 2012 or 2013 (see Section 1.4 of the EIS for more details). For this reason, USACE and EPA have identified a need to either expand the Jacksonville ODMDS or designate a new site in the vicinity.

1.2 Proposed ODMDS Alternative Sites

Three alternative sites are being considered (Figure 1). Alternative Site 1 is 3.83 nmi^2 in size, and Alternative Sites 2 and 3 are 4 nmi^2 in size. Sites 1 and 2 are 4.4 nmi east of Jacksonville Beach. Site 1 is contiguous with the south and east boundaries of the Jacksonville ODMDS, and water depths range from 13.1 to 20.1 meters (m) (mean = 17.3 m). Site 2 is south of the Jacksonville ODMDS, and water depths range from 13.4 to 19.2 m (mean = 16.8 m). The southern portion of Site 1 overlaps with the northern portion of Site 2. Site 3 is just over 1 nmi south of the Fernandina Beach ODMDS and 3.6 nmi east of Little Talbot Island, and water depths range from 14.0 to 18.9 m (mean = 16.9 m).

1.3 Units of Measure

Volumes of dredged material are discussed in cubic yards (cy) as is traditional in U.S. dredging-related documents. Water depths are noted in meters for compatibility with fisheries research documents. Large distances, ship lengths, and speeds are referred to in terms of nautical miles (nmi), feet, and knots, respectively, for comparison and continuity with nautical charts of U.S. waters (Maptech 2007). Photosynthetically active radiation (PAR) is measured in units of µmol photons/square meter/second but is stated as PAR units or simply ‘units’ for short. Water turbidity is measured in the widely-used formazin turbidity units (FTU). Temperature is in the metric unit Celsius (or °C). Faunal weights and measures are in metric units to facilitate comparison with other analytical and biological studies and because the comprehensive decimal system is the standard for science (Fenna 2002). Lengths of teleosts (bony fishes) are given as a standard length (SL), measured from the anterior projection of the snout to the posterior-most extension of the vertebral column (usually the caudal peduncle). Shark lengths are given as a total length (TL), measured from the tip of the snout to the posterior-most tip of the upper caudal lobe.

2 ESSENTIAL FISH HABITAT DESIGNATION

This document assesses Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC) in the project area; details life stages of important recreational and commercial fisheries that may utilize EFH within the project area; summarizes life history and reproductive characteristics of species and species-groups; and assesses the potential of direct, indirect, and cumulative effects of the proposed action on EFH and HAPC. This assessment evaluates potential adverse impacts of dredged material disposal in the project vicinity.

The EFH within and adjacent to the project site was assessed in accordance with the amended version of the Magnuson Fishery Conservation and Management Act of 1976 which was subsequently renamed the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (MSA 16 U.S.C. 1855 (b)), and reauthorized in 2006, states that:

- Federal agencies must consult with the Secretary on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH.
- The Secretary shall provide recommendations (which may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH) to conserve EFH to federal or state agencies for activities that would adversely affect EFH.
- The federal action agency must provide a detailed response in writing to National Marine Fisheries Service (NMFS, also known as NOAA Fisheries) and to any council commenting under §305(b)(3) of the MSA within 30 days after receiving an EFH Conservation Recommendation.

An amendment to the MSA was published in October 1996 (the Sustainable Fisheries Act ([SFA] 16 U.S.C. 1801). The SFA requires identifying habitats needed to create sustainable fisheries and comprehensive fishery management plans with habitat inclusions. The EFH provisions of the act are intended to promote the protection, conservation, and enhancement of EFH and mandate that any federal agency proposing activities that may adversely affect EFH first initiate coordination with NMFS. The action agency must then evaluate the effects of proposed actions on EFH and federally managed species.

EFH is defined by NMFS (2004) and approved by the Secretary of Commerce acting through NMFS (50 CFR 600.10):

> “Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA § 3(10)).”

Terms used and defined by NMFS (2004 and 2008) that pertain to EFH and that will be used in this document include:

> **Adverse effect**: Any impact which reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species’ fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.
>
> **Necessary**: Means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem.

Spawning, breeding, feeding, or growth to maturity: Covers a species' full life cycle.

Substrate: Includes sediment, hardbottom, structures underlying the waters, and associated biological communities.

Waters: Include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate.

Also, the term "fish" is used here to refer to shellfish and finfish of management interest.

2.1 Role of Fishery Management Councils and NMFS Highly Migratory Species Management Division

The South Atlantic Fishery Management Council (SAFMC) is one of eight regional fishery management councils in the United States that implements regulations through NMFS for species in its management region. This council is responsible for managing and conserving many fish stocks between state waters and the eastern extent of the exclusive economic zone (EEZ) (200 nmi offshore) off Florida's Atlantic coast south to Key West, along with offshore waters of several other east-coast states. There are 79 fish species managed by SAFMC, and an additional 8 species of crustacea, 2 species of macroalgae, various soft and hard corals, coral reefs, live and hardbottom habitat, and live rock (SAFMC [no date]; Table 1). Coral reefs are defined by fishery management councils as consisting of hardbottom, deepwater banks, patch reefs, and outer bank reefs (GMFMC and SAFMC 1982). Live rock is defined by SAFMC as comprising living marine organisms, or an assemblage thereof, attached to a hard substrate, including dead coral or rock. Individual mollusk shells are not considered live rock (SAFMC [no date]). The NMFS Office of Sustainable Fisheries provides oversight and support for SAFMC through the development of national policies, guidance, and regulations.

Although SAFMC drafted a fishery management plan in 1998 for the Atlantic calico scallop (*Argopecten gibbus*) (SAFMC 1998), no management actions or regulations were implemented or finalized (D. Dale *pers. comm.*, P. Wilber *pers. comm.*). SAFMC once co-managed red drum (*Sciaenops ocellatus*) with the Atlantic States Marine Fisheries Council (ASMFC), and SAFMC drafted a fishery management plan for the species in federal waters in 1998 (SAFMC 1998). However, the plan was repealed in 2008 at which time ASMFC assumed sole management (D. Dale *pers. comm.*), which consists of state jurisdictional waters. Although harvest and possession of red drum is prohibited in federal waters off Florida, there are no EFHs identified or described outside of state jurisdictional waters (D. Dale *pers. comm.*, P. Wilber *pers. comm.*).

Although SAFMC manages the most species in Florida's east coast federal waters (>3 nmi out to 200 miles offshore), NMFS also manages and protects marine resources in federal waters. The Highly Migratory Species Management Division of NMFS manages four main groups of pelagic fishes: sharks, tunas, swordfish, and billfishes (NMFS 2009). The managed sharks are divided into categories consisting of Smoothhound Sharks (1 family, 2 species), Large Coastal Sharks (3 families, 11 species), Small Coastal Sharks (2 families, 4 species), Pelagic Sharks (3 families, 5 species), and Prohibited Sharks (8 families, 19 species) (NMFS 2009). Additional managed migratory groups include Billfish (1 family, 5 species), Swordfish (1 species), and Tunas

(1 family, 5 species) (NMFS 2009, 50 CFR § 600 and 635). Table 2 provides a complete list of Atlantic highly migratory species and fishery management plans (FMPs) managed by NMFS.

The smooth dogfish (*Mustelus canis*) and the Florida smoothhound (*Mustelus norrisi*) were added to the Atlantic Highly Migratory Species Fishery Management Plan in July 2010 (D. Dale *pers. comm.*). NMFS considers the two species to be morphologically and genetically similar enough to be considered the same wide-ranging species, and they should be managed as such. Although peer-reviewed studies appear to be lacking, NMFS (2010) states that "*emerging molecular and morphological research has determined that Florida smoothhounds have been misclassified as separate species from smooth dogfish*". Although the Florida smoothhound has been considered separate and distinct from the smooth dogfish since its description in 1939 (Nelson et al. 2004), NMFS suggests "*there are insufficient data at this time to separate smooth dogfish and Florida smoothhound stocks, and that they should be treated as a single stock until scientific evidence indicates otherwise*" (Section 1.3.5 of NMFS 2010). The two species are currently managed as a single unit (Smoothhound Sharks), and EFH for this unit has been identified and described (D. Dale *pers. comm.*).

In addition to species managed by SAFMC and the Highly Migratory Species Management Division of NMFS, some species managed by the Mid-Atlantic Fishery Management Council (MAFMC) have EFH identified as far south as the Florida Keys (NMFS 2008), since councils have the ability to designate EFH outside their region of jurisdiction (Geo-Marine 2008). Although MAFMC does not have jurisdiction along the east coast of Florida, identified EFH for MAFMC-managed species will nonetheless be addressed in the project area. MAFMC manages a total of 13 species (13 families) in 7 different FMPs (NMFS 2008, MAFMC 2010). The MAFMC management plans consist of the Atlantic Surfclam and Ocean Quahog FMP (2 families, 2 species); Atlantic Mackerel, Squid, and Butterfish FMP (4 families, 4 species); Dogfish FMP (1 species); Monkfish FMP (co-managed with New England Fishery Management Council [NEFMC]) (1 species); Tilefish FMP (1 species);, Bluefish FMP (1 species); and Summer Flounder, Scup, and Black Sea Bass FMP (3 families, 3 species) (MAFMC 2010). Management of the Monkfish FMP is lead by the New England Fishery Management Council with MAFMC as a co-managing agency (MAFMC 2010). Table 3 lists species and FMPs managed by MAFMC.

2.2 Habitats within the Project Area

Site designation surveys were conducted in spring and fall 2010 to characterize the physical environment and biological resources of the alternative sites including sediment characteristics (physical and chemical), benthic infauna, epifauna, and water chemistry characteristics. As stated in Section 1.2, water depths at the three alternative sites ranged from 13.1 to 20.1 m based on October 2009 and March 2010 sidescan survey data. In general, most of the seafloor in and around the alternative sites consists of soft or shelly substrates, based on results of sediment grab, mollusk dredge, and otter trawl sampling (ANAMAR 2011). Sediment grain size analysis showed a predominance of sand (70% to 99%) in the area as a whole (ANAMAR 2011). Sites 1 and 2 and the adjacent area had somewhat higher percent silt and clay than Site 3 and the surrounding area (ANAMAR 2011). Along with soft substrate, some hardbottom and anthropogenic debris were identified during sidescan and diver surveys (ANAMAR 2010). Transverse arks (*Anadara transversa*) were abundant in many areas throughout the three sites based on results of faunal surveys (ANAMAR 2011). Dense aggregations of this species, along with shingle tube worm (*Owenia fusiformis*) colonies and shell fragments, may be used as structure by small reef-dwelling animals.

The following tables summarize water column parameters by alternative site recorded during the spring and fall 2010 surveys. Additional information can be found in ANAMAR (2011).

Spring 2010 Water Column Profile Parameters by Alternative Site					
Site Number(s) or Adjacent Area	Range of Parameters (ebb and flood tides combined)				Maximum Normalized PAR (%)
	Dissolved Oxygen (mg/L)	Salinity (ppt)	Temperature (°C)	Turbidity (FTU)	
Sites 1 & 2 Combined	7.4–8.2	32.5–33.9	15.2–16.4	0.9–14.6	42.3
Site 3	7.2–8.0	33.3–33.6	15.0–16.4	0.0–24.7	64.2

Source: ANAMAR (2011)

Spring 2010 CTD-Profile Depth at Light Extinction by Alternative Site	
Site Number(s) or Adjacent Area	Range of Depths at Light Extinction[1] (ebb and flood tides combined) (m)
Sites 1 & 2 Combined	2.75–5.50
Site 3	3.25–8.75

[1] Depth at light extinction is defined here as the depth at which normalized PAR values are equal to or less than 2% of surface PAR values.

Source: ANAMAR (2011)

Fall 2010 Water Column Profile Parameters by Alternative Site					
Site Number(s) or Adjacent Area	Range of Parameters (ebb and flood tides combined)				Maximum Normalized PAR (%)
	Dissolved Oxygen (mg/L)	Salinity (ppt)	Temperature (°C)	Turbidity (FTU)	
Sites 1 & 2 Combined	6.3–6.8	36.0–36.1	27.7–28.3	-0.01–2.9	76.9
Site 3	5.7–7.0	35.9–36.1	27.7–28.5	-0.03–4.7	85.4

Source: ANAMAR (2011)

Fall 2010 CTD-Profile Depth at Light Extinction by Alternative Site	
Site Number(s) or Adjacent Area	Range of Depths at Light Extinction[1] (ebb and flood tides combined) (m)
Sites 1 & 2 Combined	13.00–13.50
Site 3	9.25–10.50

[1] Depth at light extinction is defined here as the depth at which normalized PAR values are equal to or less than 2% of surface PAR values.

Source: ANAMAR (2011)

Alternative Sites 1 and 2 and Adjacent Area. Along with the predominantly soft, sandy bottom, other features were found during the 2010 surveys (Figure 2). Site 1 contains an estimated 6.9 acres (0.2% of the site) of rock rubble and 147.7 acres (4.6% of the site) of shingle tube worm and transverse ark aggregations as identified in sidescan imagery (Figure 2). Site 2 contains approximately 0.5 acres (0.015% of the site) of rock rubble based on sidescan imagery. Transverse arks were abundant in trawl and mollusk dredge samples from Site 2 (ANAMAR 2011) but aggregations did not form enough relief to be identified by sidescan sonar. Rock rubble was primarily found near the Jacksonville ODMDS, and may be disposal material based on sidescan (ANAMAR 2010) and trawl sampling results (ANAMAR 2011). Dive reconnaissance south of the Jacksonville ODMDS (within Site 1) indicated large, flat rocks of unknown origin (USEPA 2010a).

A group of metal containers of unknown origin were found clustered in a 15- by 20-m area within Site 1 during sidescan and dive surveys (ANAMAR 2010). Trawl netting was observed on the containers during dive surveys, and sponges were found attached to the metal containers (ANAMAR 2010). An unidentified elongate object measuring approximately 21 by 5 m with an estimated maximum relief of 2 m was observed 415 m south of Site 2 during a sidescan survey (ANAMAR 2010) and subsequent surveys. The object appears to be a derelict vessel based on high-resolution sidescan imagery. A submarine cable intersects the southwestern corner of Site 2 as it runs east-west from Neptune Beach, Florida, to the Bahamas (Maptech 2007).

Alternative Site 3 and Adjacent Area. Site 3 is composed primarily of a soft sandy bottom. Although sled video data from the south-central portion of Site 3 showed scattered soft coral (USEPA 2010b), no hardbottom was detected within Site 3 using sidescan sonar imagery (Figure 3). Trawl and mollusk dredge sampling results indicated high densities of transverse arks in and around Site 3 (ANAMAR 2011), although mollusk aggregations were not detected during sidescan surveys. Low-relief limestone rubble was confirmed within the Fernandina Beach ODMDS (north of Site 3) during a dive survey (USEPA 2010b). Exposed and potential hardbottom areas were observed by sidescan and reconnaissance dives east of Site 3 and roughly following the 18.3-m contour line in National Oceanic and Atmospheric Administration (NOAA) Chart 11488 (ANAMAR 2010, USEPA 2010b).

A 12-meter-long metal-hulled derelict vessel was found resting upright on the seafloor just outside the western boundary of Site 3 at a depth of 15.2 m during sidescan sonar and dive surveys of the area (ANAMAR 2010). The vessel was observed covered by encrusting organisms and had associated fish assemblages during dive surveys (ANAMAR 2010). A loggerhead sea turtle (*Caretta caretta*) was observed by divers at the derelict vessel (ANAMAR 2010).

The three alternative sites will be referred to collectively as the ‘project area’ when addressing identified EFH and HAPC in tables and in the following sections. This is due in part to the coarse level of EFH spatial data available from NMFS, the relative proximity of the three sites, and the similar depths and substrates shared between the sites.

2.3 Essential Fish Habitat

The NOAA Fisheries Essential Fish Habitat Mapper (NOAA Fisheries 2011) online resource was accessed to identify EFH and HAPC, along with EFH-related documents by NOAA and various management councils. HAPC represent a more limited habitat designation for each species or managed group. HAPC are described as ecologically important rare subsets of EFH and are particularly susceptible to environmental degradation due to proximity to human activities. Such areas may serve as key habitats for migrations, spawning, or rearing of fishes and invertebrates. Some HAPC are geographically-defined or habitat-specific, while others are taxa-specific or even life-stage-specific. The following tables present EFH identified by SAFMC, and geographically-defined HAPC, respectively that may be present in the project area.

Essential Fish Habitat Important to a Variety of Managed Taxa and Applicable to this Project[1]
Live/hardbottom
Coral and coral reefs
Artificial reefs
Sargassum[2]
Water column

[1]Source: Appendix 4 in NMFS (2008).
[2]Sargassum EFH has not yet been identified (P. Wilber, *pers. comm.*) but is included here following NMFS (2008).

Estuarine EFH will not be discussed considering water column and faunal data collected during the spring and fall 2010 surveys suggest the alternative sites are non-estuarine, at least during spring and fall (ANAMAR 2011). The above-listed marine areas will be addressed when applicable in the following section.

Geographically Defined Habitat Areas of Particular Concern Applicable to this Project[1]
Hardbottom[2]
Sargassum habitat[3]

[1]Source: Appendix 5 in NMFS (2008).
[2]Part of Coral, Coral Reefs, and Live/Hardbottom Habitat FMP.
[3]Sargassum HAPC has not yet been identified (P. Wilber, *pers. comm.*) but is included here following NMFS (2008) and because the project area is within the range of the two managed sargassum species.

HAPC are afforded no additional regulatory protection under the MSA. However, actions by federal agencies thought to impact such HAPC will be scrutinized during the EFH consultation process. Additionally, such agencies may be faced with more stringent conservation recommendations (NMFS 2008).

The NOAA EFH Mapper online resource and NOAA (2009) are supplemented below with a literature review, results of the faunal portions of the spring and fall 2010 site designation surveys, and previous studies on the fauna of the Jacksonville ODMDS and the Fernandina Beach ODMDS. Faunal surveys undertaken in 2010 included benthic infaunal grab sampling (108 replicate samples resulting in 4.08 m^2 sampled), mollusk dredge sampling (9 samples resulting in 1,952 m^2 sampled), and epifaunal trawl sampling (46 samples resulting in 186,981 m^2 sampled) (ANAMAR 2011). Gear utilized consisted of a Young-modified van Veen grab sampler (0.04 m^2 per grab) for benthic infauna, a rocking-chair dredge (0.37 m width) for mollusks, and an otter trawl (7.3 m width) for epifauna (ANAMAR 2011).

Results of benthic infaunal sampling indicated robust diversity (474 taxa identified during the two surveys), particularly during fall when 403 taxa were identified (ANAMAR 2011). Fall samples were numerically dominant in benthic infauna (totaling 8,195 individuals) compared to spring samples (totaling 7,552 individuals). Mollusk dredge sampling was undertaken during the fall survey and resulted in a total of 7,973 individual mollusks representing 19 taxa (ANAMAR 2011). The transverse ark was the most numerically dominant mollusk, amounting to 94.14% of all mollusks caught (ANAMAR 2011). Epifaunal (trawl) sampling was conducted in spring and fall (ANAMAR 2011). More than 23,423 individual invertebrates representing 125 taxa and 10,622 fishes representing 72 species were caught during the two surveys (ANAMAR 2011). Additional information on sampling results can be found in the ANAMAR (2011) report entitled *Site Designation Studies for a New Ocean Dredged Material Disposal Site off Jacksonville, Florida: Spring and Fall 2010 Survey Results*.

Managed taxa captured during the 2010 surveys are discussed in Section 2.4 whenever applicable. While the absence of a given managed species in samples is not evidence of absence of essential habitat, the presence of a given species in samples indicates habitat usage in the area.

2.4 Managed Habitats

2.4.1 Marine Water Column

SAFMC (1998) describes habitats within the water column as “gradients and discontinuities in temperature, salinity, density, nutrients, light, [and other parameters]” that are affected by spatial and temporal forces. This fluidly structured habitat is identified as EFH by SAFMC and MAFMC in various FMP amendments (NMFS 2008).

Inner shelf waters (up to 20 m depth), including the project area, are affected by physical processes such as freshwater runoff, winds, tides, and bottom friction (SAFMC 1998). Southern-flowing longshore currents are transient in the area off Jacksonville and are limited to a narrow band parallel to the shoreline (Bumpus 1973). Although the project area is not greatly affected by the Florida Current considering the distance to the outer continental shelf, the meanderings of this current take place far into the continental shelf and affect the circulation there (Emery and Uchupi 1972, Kantha et al. 1982). Drift bottle studies have shown that the surface currents off Jacksonville slowly flow northeast during spring and flow south during all other seasons (Emery and Uchupi 1972). Bottom currents appear to be complex and change direction with seasons based on seafloor drifter studies depicted in Emery and Uchupi (1972). Freshwater outflow may occasionally reach the project area from the St. Johns River, and additional freshwater runoff may originate from the nearby coastline. Submarine groundwater discharge areas are have been found off Florida’s east coast as far as 27 nmi from shore (Emery and Uchupi 1972) and may also contribute freshwater to the area.

The project area is contained within a region affected by four main water masses: the Florida Current, Carolina Capes, Georgia, and Virginia coastal water masses (SAFMC 1998). Virginia coastal water enters the region north of Cape Hatteras, North Carolina (SAFMC 1998). Carolina Capes and Georgia water masses are mixtures of freshwater runoff and Gulf Stream water (SAFMC 1998). Eddies can form anywhere along the Florida Current/Gulf Stream and can spin off into nearby shelf or slope waters (SAFMC 1998).

All managed species discussed within this document utilize the water column during at least one life stage, and therefore are profoundly affected by changes to water parameters. Based on spring and fall 2010 survey results, the project area water column is chiefly marine, at least during spring and fall.

2.4.2 Pelagic Sargassum

Pelagic sargassum habitat focuses on two species of pelagic brown macroalgae, *Sargassum fluitans* and *S. natans*, both having the common name of sargassum. These macroalgae drift with the current, provide complex and important habitat for hundreds of marine species, and are thus managed as habitat (SAFMC 2002). Sargassum also provides important forage areas for many bird species (SAFMC 2002). *Sargassum natans* appears to be more abundant than *S. fluitans* according to SAFMC (2002).

Off the southeastern United States, sargassum can be found drifting in prevailing surface currents of the continental shelf, along the Gulf Stream, or cast ashore (SAFMC 2002). Tides, wind, and current often create long mats or scattered clumps of sargassum mixed with other flotsam (SAFMC 2002). The majority of sargassum off the east coast of the United States occurs along the western edge of the Gulf Stream (SAFMC 2002).

No EFH or HAPC are currently identified on the NOAA EFH Mapper (NOAA Fisheries 2011). SAFMC has not yet formally identified EFH or HAPC for sargassum (SAFMC 2002), and formal designation is not expected to occur for a year or more after the time of this writing (P. Wilber *pers. comm.*).

No sargassum was recorded during spring and fall 2010 trawl surveys (ANAMAR 2011) or otherwise observed during the surveys. The genus was recorded in October 1985 as part of the trawl catch at the Fernandina Beach ODMDS (Continental Shelf Associates 1986), but no biomass or other metrics were given. Sargassum is not thought to contribute greatly to the habitats of the project area due to the considerable distance between the project area and the Florida Current or other significant source of the pelagic macroalgae.

2.4.3 Live/Hardbottom

Live/hardbottom habitat is included in the Coral, Coral Reefs, and Live/Hardbottom Habitat (Coral) FMP (SAFMC [no date]) and is also managed as habitat (SAFMC 1998). The Coral FMP includes all taxa belonging to the classes hydrozoa and anthozoa, along with habitats broadly termed coral reefs, and assemblages of live organisms attached to hardbottom (termed 'live rock') (SAFMC [no date]). This complex of mineral and biological factors that make up hardbottom habitat provide shelter and other necessities for innumerable species, both managed and non-managed.

The class hydrozoa includes a wide variety of taxa including hydroids, hydrocorals, and fire corals, all of which are managed in the Coral FMP (SAFMC [no date]). There are some 3,800 species within the hydrozoa group, although this number includes many nominal species and suspected synonyms (Schuchert 2011). Similarly, all members of the class anthozoa (e.g., precious corals, sea fans, sea whips, sea anemones, stony corals), including those not strictly considered corals, are managed in this FMP (SAFMC [no date]). Anthozoans are most often colonial organisms, although other body forms exist within the more than 6,000 species making up this class (Hyman 1940, Fautin and Romano 2011). This FMP defines coral reefs as consisting of hardbottom, deepwater banks, patch reefs, and outer bank reefs (SAFMC [no date]). The live rock component of this FMP refers specifically to any living organism assembled or attached to a hard substrate, including dead coral or rock, but excluding individual mollusk shells (SAFMC [no date]).

Small EFH polygons appear to be within the vicinity of the project area, and possibly contained within the project area based on the NOAA Fisheries EFH Mapper (NOAA Fisheries 2011). EFH are mapped for coral, coral reefs, and live/hardbottom habitat as a collective unit (not broken down by life stage, taxa, or type) (NOAA Fisheries 2011). HAPC for coral reefs and hardbottom appear to be in the vicinity of the project area or contained within the project area (NOAA Fisheries 2011). The nearest Oculina Bank HAPC is located far southeast of the project site, and is associated with the edge of the continental shelf off Palm Beach County, Florida (NOAA Fisheries 2011).

Several members of the classes hydrozoa and anthozoa were captured by trawl in spring and fall 2010 (ANAMAR 2011). Most of these taxa were caught in very small numbers, except in the case of sea anemones (actiniaria), which were among the most abundant invertebrates caught (ANAMAR 2011). A small number of northern star coral (*Astrangia poculata*) colonies were also captured by mollusk dredge south of Sites 1 and 2. All northern star coral colonies were small (approximately 10 mm diameter) and were attached to shell fragments or to live transverse arks. Ivory tree coral (*Oculina* cf. *varicosa*) fragments were found in only one trawl sample from northeast of the Jacksonville ODMDS (ANAMAR 2011). A small number of gorgonia were observed during reconnaissance sled camera tows within and adjacent to Sites 1 and 2. The following table presents taxa managed under the Coral FMP which were collected by trawl during the spring and fall 2010 surveys of the project area.

Taxa Managed Under the Coral FMP Captured by Trawl during the Spring and Fall 2010 Surveys[1]

Scientific Name (Common Name or Vernacular)	Total Number Captured, Measurements
Hydrozoa: Hydroidolina (hydroids)	*n* = >21, not measured
Carijoa sp. (snowflake coral genus)	*n* = 1, not measured
Leptogorgia sp. (a sea whip genus)	*n* = 3, not measured
Renilla sp. including *R. reniformis* (sea pansies)	*n* = 36, not measured
Virgularia presbytes (sea pen)	*n* = 2, not measured
Actiniaria (sea anemones)	*n* = >724, not measured
Astrangia poculata (northern star coral)	*n* = X, colony diameter ca. 10 mm, ca. 9 cups per colony
Oculina cf. *varicose* (ivory tree coral)	*n* = X, 3 fragments up to 35 mm long

[1]Survey data are combined here. See ANAMAR (2011) for further details on managed species caught during trawl sampling. Includes samples from both within and adjacent to the alternative sites.

X = present but not easily counted (colonial organisms)

Source: ANAMAR (2011)

Densities of trawled managed corals within the alternative sites were low (range = none caught to 0.46 individuals/1,000 m^2) with the exception of anemones (range = >3.91 to 10.96 individuals/1,000 m^2), which constituted >3.09% of all invertebrates caught by trawl (ANAMAR 2011). The following table presents density per taxa and total density of managed corals per alternative site collected during the trawl surveys.

Densities of Taxa Managed Under the Coral FMP Captured by Trawl during the Spring and Fall 2010 Surveys[1]			
Scientific Name (Common Name or Vernacular)	**Taxa Densities (per 1,000 m^2)**		
	Site 1	**Site 2**	**Site 3**
Hydrozoa: Hydroidolina (hydroids)	>0.39	0.46	None Caught
Carijoa sp. (snowflake coral genus)	0.02	0.02	None Caught
Leptogorgia sp. (a sea whip genus)	0.02	0.02	0.03
Renilla sp. including *R. reniformis* (sea pansies)	0.41	0.41	0.13
Virgularia presbytes (sea pen)	None Caught	None Caught	None Caught
Actiniaria (sea anemones)	>3.91	4.81	10.96
Astrangia poculata (northern star coral)	None Caught	≥0.02	None Caught
Oculina cf. *varicose* (ivory tree coral)	≥0.02	None Caught	None Caught
Total Taxa Density	**>4.77**	**≥5.74**	**11.12**

[1]Survey data are combined here. Densities from trawl samples from adjacent and outside of alternative sites are excluded. See ANAMAR (2011) for further details on managed species caught during trawl sampling.

Source: ANAMAR (2011)

Hydroids were collected during October 1985 trawl sampling in and around the Fernandina Beach ODMDS, although the number collected was not recorded (Continental Shelf Associates 1986). Sea pansies were collected during March and December 1979 trawl sampling in and around the Jacksonville ODMDS (USEPA 1983).

2.4.4 Artificial Reefs

Artificial reefs are defined by SAFMC (1998b) as intentionally placed structures within the marine environment for the purpose of creating, restoring, or improving long-term habitat for the exploitation, conservation, or protection of the resulting marine ecosystems that establish on these materials. SAFMC (1998) further states that artificial reefs should be viewed primarily as fishery management tools. A similar definition by Seaman and Jensen (2000) states an artificial reef is one or more objects of natural or anthropogenic origin placed purposefully on the seafloor in order to influence physical, biological, or socioeconomic processes relating to marine biological resources.

Although no structures fitting the above definitions are found in or around the project area, there are anthropogenic structures fitting the Other Manmade Structures subsection of the Artificial Reefs section in SAFMC (1998). The two derelict vessels and the group of metal containers discussed in Section 2.2 (Habitats within the Project Area) all fit the SAFMC (1998) description of other manmade structures to varying degrees and thus are considered EFH. As discussed earlier, only the metal containers are positioned within an alternative site (Site 1), while the remaining two objects are outside of the three sites. The faunal assemblages associated with the two derelict vessels are not expected to be significantly impacted by dredged material disposal activities and are discussed only because of their adjacency to the project area and their likeliness of attracting and retaining reef-oriented invertebrates and fishes.

2.5 Managed Taxa

This section discusses managed taxa that are likely to occur in the project area based on the best available scientific data.

2.5.1 Sargassum

The sargassum species complex managed under this FMP was discussed as pelagic habitat in Section 2.4.2.

Effects Determination

The project area is not directly affected by the Florida Current and is far enough inshore that only a small amount of sargassum is expected to occur. For this reason, minimal or no effects to sargassum are expected.

2.5.2 Coral, Coral Reefs, and Live/Hardbottom Habitat

The Coral FMP was discussed while addressing hardbottom habitat in Section 2.4.3.

Effects Determination

As discussed in Section 2.4.3, members of the Coral FMP are present in only very low numbers within the project area, except for sea anemones, which are common based on trawl catches (ANAMAR 2011). Such sessile organisms can experience long-term impacts from sedimentation and short-term impacts from temporarily increased turbidity caused by disposal activities. Only minimal impacts to most Coral FMP members are expected due to the very low densities and because of the relative paucity of suitable attachment sites. Anemones may experience some impacts due to their relatively higher densities at the alternative sites. However, anemones appear capable of extending themselves above newly placed sediment to a limited extent, and consequently only moderate effects are expected for this taxon. If disposal material includes limestone rubble, it is possible the site may experience an increase in coral densities.

2.5.3 Shrimp

The Shrimp FMP consists of six species belonging to three families. Penaeid shrimp managed by this plan consist of northern brown shrimp (*Farfantepenaeus aztecus*), northern pink shrimp (*Farfantepenaeus duorarum*), northern white shrimp (*Litopenaeus setiferus*), and seabob (*Xiphopenaeus kroyeri*) (SAFMC [no date], P. Wilber *pers. comm.*). Of the rock shrimps, only the brown rock shrimp (*Sicyonia brevirostris*) is managed (SAFMC [no date]). The solenocerid species royal red shrimp (*Pleoticus robustus*) is also managed in this FMP (SAFMC [no date]).

<u>Penaeid Shrimp (Penaeidae)</u>

In a scoping letter response to USEPA and USACE, NMFS expressed concern that the northern brown shrimp and northern white shrimp may be affected by the proposed action (Appendix A of the EIS). These two species, plus two other managed penaeid shrimp species include the project area within their respective ranges and occur from inshore waters to up to about 110 m depth (Tavares 2002b). Preferred substrates include mud, sand, peat, and shell bottoms

(Tavares 2002b). The four managed species can occur within estuaries at least during their early life history stages (Tavares 2002b). The northern white shrimp is most abundant in brackish water estuaries over soft mud and clay bottoms (Tavares 2002b). Post-larvae and juveniles live and grow within estuaries (Tavares 2002b). Adults are nocturnal (except for northern white shrimp and seabob, which are more diurnal) (Tavares 2002b), although even nocturnal species may be active by day during highly turbid conditions.

The abundance of shrimp may correspond with the availability of favored substrates offshore (SAFMC 1998). For instance, northern pink shrimp appear to show a positive correlation with course-grain and calcareous substrate (SAFMC 1998). Northern white and brown shrimp appear to favor soft sediment near to shore and occur in dense concentrations there (SAFMC 1998).

Spawning takes place over several months, from about March through September (Carson 1944). Hatching takes place in approximately 14 hours (Carson 1944). Larvae can occur in marine waters, where they live within the water column and consume zooplankton (SAFMC 1998). Post-larvae are generally benthic. In northern areas, some post-larvae may overwinter buried within the substrate (SAFMC 1998). In this region, post-larvae may use inshore emergent vegetation such as smooth cordgrass (*Spartina alterniflora*) and rush (*Juncus* spp.), where they are able to obtain enough food for rapid growth (SAFMC 1998). These emergent vegetated habitats are thus critically important (SAFMC 1998). Within these habitats, sediment mixtures of mud appear to be favored by juveniles, as is a brackish salinity regime (SAFMC 1998). However, various studies have contradicted one another on the degree of importance of low salinities (SAFMC 1998). As juveniles approach adult size, they migrate towards waters having higher salinities (SAFMC 1998). The largest juveniles and adults are generally found in the highest salinity regimes, including open marine waters (SAFMC 1998). Some studies indicate that temperature range and food availability have greater impact on growth than does salinity (SAFMC 1998). Juveniles appeared to grow little or not at all in 16°C, but growth rates increased rapidly above 20°C in one study (SAFMC 1998). Excessively cold winters have been known to cause mortality in all life stages and are thought to contribute to reduced landings following such events (SAFMC 1998).

EFH for penaeid shrimp include estuarine nursery areas, offshore habitats, and connecting waterways for spawning and growth to maturity (SAFMC 1998). Nursery areas included as EFH consist of tidal freshwater, coastal wetlands (e.g., intertidal marshes, tidal forests, mangroves), estuaries, nearshore flats, and submerged aquatic vegetation (SAFMC 1998). HAPC include coastal inlets, state-identified nursery habitats of importance to this group, and state-identified overwintering areas (SAFMC 1998). Tidal creeks and salt marshes serving as nurseries are perhaps the most important habitats for penaeid shrimp (SAFMC 1998).

EFH (in the form of HAPC) is identified by the NOAA EFH Mapper for penaeid shrimp as a whole and is not broken down by life stage (NOAA Fisheries 2011). HAPC are identified for penaeid shrimp as including areas within the St. Johns and Nassau rivers but not extending east of the river mouths (NOAA Fisheries 2011).

Although a large number (n = 2,164) of penaeid shrimp were caught by trawl in 2010, no managed penaeid shrimp were identified (ANAMAR 2011). A small number (n = 9) of northern brown shrimp were collected during October 1985 trawl sampling in and around the Fernandina

Beach ODMDS (Continental Shelf Associates 1986). No managed penaeid shrimp were recorded from March and December 1979 trawl sampling in and around the Jacksonville ODMDS (USEPA 1983).

Effects Determination

Although no managed penaeid shrimp were identified in 2010 trawl catches, one or more species are likely present within the project area considering that there is an active commercial shrimp fishery within the immediate area. Shrimp trawling occurs during 9 or 10 months of the year within the vicinity of Site 3 but occurs only 1 or 2 months of the year near Sites 1 and 2 (N. Jones *pers. comm.*). Figure 4 presents areas frequented by commercial shrimp trawlers in and around the three alternative sites.

The designation of a new dredged material disposal site may provide shrimp a haven from trawlers considering that disposal sites are avoided for fear of net damage (J. Thomas *pers. comm.*). Also, considering that much of the dredged material will consist of silts and clays, it appears likely that the area may remain suitable for penaeid shrimp. For the reasons stated above, only minimal effects are expected on penaeid shrimp.

Brown Rock Shrimp (*Sicyonia brevirostris*)

The brown rock shrimp is a nocturnal species most often found on white sand bottom with shell fragments and in water depths from nearshore to at least 190 m (Huff and Cobb 1979, Tavares 2002b). The species is most abundant in depths of less than 100 m (Tavares 2002b). Very large catches have been recorded off northeast Florida (i.e., Cape Canaveral, Fort Pierce) in water 34 to 55 m deep (Tavares 2002b). The species is most active at night based on trawl catches from the Hourglass Cruises in the Gulf of Mexico reported in Huff and Cobb (1979).

Spawning occurs off the Florida east coast from November through January, and females may spawn as many as three times in a season (FWC 2008). The planktonic larval stage lasts for about 1 month (FWC 2008). The smallest mature females measure about 18 mm post-orbital carapace length, and most females reach maturity by 26 mm post-orbital carapace length (FWC 2008). Florida's east coast (Brevard, Duval, and Nassau counties) accounts for most of the landings of this species in the state (FWC 2008).

EFH consists of terrigenous and biogenic sand substrate in offshore waters from 18 to 182 m deep, including Florida's east coast (SAFMC 1998). Included in EFH is "shelf current systems" near Cape Canaveral, Florida, which provide transport to planktonic larvae (SAFMC 1998). Also, the Gulf Stream is EFH due to its significant role in larval dispersal (SAFMC 1998). HAPC are not currently identified for brown rock shrimp, but it is suggested that such deepwater areas as the Oculina Bank may be important nursery grounds (SAFMC 1998). EFH is not currently identified on the NOAA EFH Mapper (NOAA Fisheries 2011).

The brown rock shrimp was the only member of this FMP identified from spring and fall 2010 trawl samples (ANAMAR 2011). A total of 73 brown rock shrimp were taken by trawl, most of which measured 10 to 20 mm post-orbital carapace length (ANAMAR 2011). Most females had not yet reached maturity based on length-at-maturity data presented by FWC (2008). Brown rock shrimp densities (individuals/1,000 m^2) were low in trawl catches and ranged from a low of 0.04 at Site 2 to a high of 0.51 at Site 3 (ANAMAR 2011). No brown rock shrimp were recorded in trawl data from October 1985 trawl sampling in and around the Fernandina Beach ODMDS

(Continental Shelf Associates 1986) or from March and December 1979 trawl sampling in and around the Jacksonville ODMDS (USEPA 1983).

Effects Determination

Based on catch-per-unit-effort of 2010 trawl data, brown rock shrimp inhabit the project area in low numbers during spring and fall. It is possible that the species is never abundant within the project area, but this remains unknown. Higher catch frequency was seen during fall (3.40 individuals/trawl sample) than in spring (0.19 individuals/trawl sample) (ANAMAR 2011). For these reasons, only minimal effects are expected for brown rock shrimp.

2.5.4 Spiny Lobster

In a scoping letter response to USEPA and USACE, NMFS expressed concern that the Caribbean spiny lobster (*Panulirus argus*), the only member of this FMP (SAFMC [no date]), may be affected by the proposed action (Appendix A of the EIS). The Caribbean spiny lobster is the most important commercial spiny lobster species in the western central Atlantic (Tavares 2002a). Within the western Atlantic this species is distributed from Bermuda and North Carolina southward through the Gulf of Mexico and the Antilles, and east to Brazil (Tavares 2002a). In Florida, the Caribbean spiny lobster occurs along both coasts and from inshore to at least 90 m depth (Tavares 2002a). Caribbean spiny lobsters are shelter-seekers, relying on rocks, reefs, seagrass beds, or artificial shelter as habitat (Tavares 2002a). Females migrate to deeper water for spawning (Tavares 2002a).

EFH for this species includes the above-mentioned habitats plus unconsolidated bottom (soft sediment), hardbottom, sponges, algal communities (e.g., *Laurencia* spp.), and mangrove habitat (e.g., red mangrove prop roots) (SAFMC 1998). The Gulf Stream, including the Florida Current, also provides EFH due to its role in dispersion of larvae (SAFMC 1998).

EFH is identified in the NOAA EFH Mapper for all combined life stages (NOAA Fisheries 2011). Identified EFH includes the project area and surrounding area, including much of the inshore, nearshore, and offshore waters of the area (NOAA Fisheries 2011). HAPC is identified nearby and southwest of the project area in a very small square between the St. Johns River mouth and Atlantic Beach (NOAA Fisheries 2011).

No spiny lobsters were collected during the spring and fall 2010 trawl surveys (ANAMAR 2011) or in previous surveys of existing disposal sites of the area (USEPA 1983, Continental Shelf Associates 1986). Considering the paucity of most types of suitable structure, this species is not likely to regularly utilize the project area.

Effects Determination

The Caribbean spiny lobster probably occurs within the project area only in low numbers, if at all, considering the paucity of structural habitat. For this reason, spiny lobster is not expected to be affected by the proposed action.

2.5.5 Snapper-Grouper Complex (Tables 1 and 4)

A total of 73 species representing 10 families in 2 orders are contained within the Snapper-Grouper Complex FMP (SAFMC [no date]). Table 1 provides a complete list of species managed. Most species are demersal, while some, such as the jacks (Carangidae), are pelagic.

There is substantial variation in life history patterns and habitat usage among this diverse multi-family and multi-order group (SAFMC 1998).

Members of this FMP are generally benthic during later life stages, but many have pelagic early life stages (SAFMC 1998). Many of these species have a planktonic larval stage, while sub-adults and adults are generally associated with structured benthic habitat (SAFMC 1998). Some of the more obvious structures are coral reefs, artificial reefs, hardbottom, ledges, cavities, and sloping softbottom surfaces (SAFMC 1998). Juveniles of some species may inhabit inshore and estuarine habits such as seagrass beds, mangroves, lagoons, and bays (SAFMC 1998).

From a regional perspective, certain areas off Florida's east coast include rock outcroppings of bio-eroded limestone and carbonate sandstone and have a relief of up to 10 m or more (SAFMC 1998). Additional natural structure off Florida includes rock outcroppings (SAFMC 1998), and reefs such as this occur over an estimated 24% of the seafloor at depths between 27 and 101 m (Parker et al. 1983). Important reef habitat is believed to occur at depths between 100 and 300 m (SAFMC 1998). Live-bottom habitat, including low-relief hardbottom, is thought to be most abundant off northeast Florida (SAFMC 1998). Artificial reefs have been permitted, created, and managed in Florida waters, usually within 15 nmi from shore and often much closer to allow access by smaller recreational vessels. Non-permitted artificial reefs are also common off Florida and often consist of piles of hard materials placed by anglers.

A total of 740 individuals representing five species managed in the Snapper-Grouper FMP were caught during spring and fall 2010 trawl sampling in and around the project area (ANAMAR 2011). In addition, several members of this FMP were recorded on sled video footage taken during October 2009 reconnaissance surveys in and around the project area. The following tables provide a breakdown of numbers caught and sizes per species along with densities per alternative site.

Fishes Managed Under the Snapper-Grouper Complex FMP Captured by Trawl during the Spring and Fall 2010 Surveys[1]	
Scientific Name (Common Name)	**Total Number Captured, Measurements**
Centropristis philadelphica (rock sea bass)	*n* = 593, mean = 107 mm (32–195 mm) SL
Centropristis striata (black sea bass)	*n* = 69, mean = 99 mm (50–167 mm) SL
Lutjanus campechanus (red snapper)	*n* = 14, mean = 72 mm (45–86 mm) SL
Stenotomus caprinus (longspine porgy)	*n* = 59, mean = 101 mm (49–199 mm) SL
Chaetodipterus faber (Atlantic spadefish)	*n* = 5, mean = 107 mm (96–114 mm) SL

[1]Survey data are combined here. See ANAMAR (2011) for further details on managed species caught during trawl sampling. Includes samples from both within and adjacent to alternative sites.

SL = standard length

Source: ANAMAR (2011)

Densities of Fishes Managed under the Snapper-Grouper Complex FMP Captured by Trawl during the Spring and Fall 2010 Surveys[1]			
Scientific Name (Common Name)	**Species Densities (individuals / 1,000 m^2)**		
	Site 1	**Site 2**	**Site 3**
Centropristis philadelphica (rock sea bass)	4.29	5.37	2.81
Centropristis striata (black sea bass)	1.06	1.17	None Caught
Lutjanus campechanus (red snapper)	0.22	0.28	None Caught
Stenotomus caprinus (longspine porgy)	0.48	0.65	0.19
Chaetodipterus faber (Atlantic spadefish)	0.02	0.02	None Caught
Total Species Density	**6.07**	**7.49**	**3.00**

[1]Survey data are combined here. Densities from trawl samples from adjacent and outside of alternative sites are excluded. See ANAMAR (2011) for further details on managed species caught during trawl sampling.

Source: ANAMAR (2011)

EFH is defined for the complex as a whole as including coral and artificial reefs, live/hardbottom, submerged aquatic vegetation, and medium- to high-relief outcroppings from nearshore to water 183 m deep (to at least 610 m deep for wreckfish [*Polyprion americanus*]) (SAFMC 1998). Water temperature must be warm enough to sustain adults of tropical and sub-tropical members of the complex (SAFMC 1998). EFH includes the water column above suitable adult habitat and pelagic habitats such as floating sargassum, which is used by larvae and post-larvae of certain species (SAFMC 1998). The Gulf Stream, including the Florida Current, is also EFH as a means of dispersal for pelagic larvae (SAFMC 1998). Certain nearshore and estuarine-oriented species need EFH such as attached macroalgae, seagrass beds, emergent estuarine vegetation, saltmarshes, tidal creeks, mangroves, oyster reefs, unconsolidated bottom (soft sediment), artificial and coral reefs, and live/hardbottom (SAFMC 1998).

The HAPC subset of EFH is defined for this large and diverse group as including habitats vital to each life stage (i.e., egg, larval, post-larval, juvenile, and adult stages) (SAFMC 1998).

The NOAA Fisheries EFH Mapper includes the project area and surrounding waters in the EFH for this group, including inshore, nearshore, and most offshore waters from Florida to Virginia (NOAA Fisheries 2011). The EFH includes all life stages for the complex as a collective unit (NOAA Fisheries 2011). There is HAPC identified near the project area but closer to shore, including much of the St. Johns and Nassau rivers (NOAA Fisheries 2011). Table 4 outlines the EFH and HAPC as identified in the NOAA EFH Mapper. Further discussion of EFH for the Snapper-Grouper Complex follows and is broken down by taxonomic group.

Sea Basses and Groupers (Serranidae)

Serranids are predatory species, most of which are demersal and are found at varying depths (inshore to approaching 200 m) (Heemstra et al. 2002). Species within this group typically are associated with structured habitat such as coral reefs and rocky substrates, but some species are instead associated with soft substrates (e.g., mud, sand) or seagrass beds (Heemstra et al. 2002, McEachran and Fechhelm 2005). Sea basses (subfamily Seraninae) appear more gregarious than the groupers (subfamily Epinephelinae), but both sub-groups are sedentary and often exhibit site specificity (Heemstra et al. 2002). Serranids generally feed on a combination of invertebrates (especially cephalopods and crustaceans) and fishes; however, some have specialized gill rakers that allow them to strain zooplankton from the water (Heemstra et al. 2002). In a scoping letter response to USEPA and USACE, NMFS expressed concern regarding the effects of the proposed action on juvenile gag (*Mycteroperca microlepis*) and black sea bass (Appendix A of the EIS).

Reproduction is poorly known for serranids. Members of the group are hermaphrodites, some of which are protogynous, while others are synchronous hermaphrodites (Heemstra et al. 2002). Certain grouper species spawn in large aggregations at specific sites, making them susceptible to overfishing (Heemstra et al. 2002). Many serranids grow rather slowly, and this K-selected life history trait limits their ability to recover from the effects of overfishing (Heemstra et al. 2002).

A total of 69 black sea bass and 593 rock sea bass were captured during spring and fall 2010 trawl sampling (ANAMAR 2011). Most of the 69 black sea bass were immature or recently matured based on lengths given in Bullock and Smith (1991) and Drohan et al. (2007). Many of the 593 rock sea bass were likely mature based on lengths given in Link (1980). Both species occurred in spring and fall samples but were most abundant in fall catches (ANAMAR 2011). Black sea bass were more abundant in fall than in spring based on catch-per-unit-effort rates of 0.65 and 2.60 individuals per trawl sample during spring and fall surveys, respectively (ANAMAR 2011). Numbers of black sea bass per trawl sample averaged 1.04 and 28.30 during spring and fall surveys, respectively (ANAMAR 2011). It is possible that these two species are year-round residents of the project area.

An additional eight rock sea bass were captured during October 1985 trawl sampling in and around the Fernandina Beach ODMDS (Continental Shelf Associates 1986). Black sea bass were collected during March and December 1979 trawl sampling in and around the Jacksonville ODMDS (USEPA 1983), but the number collected was not indicated (Continental Shelf Associates 1986).

Black sea bass spawn in the southern portion of their range from January through June, peaking from March through May (Drohan et al. 2007), although Gulf of Mexico populations spawn from December to April (Hood et al. 1994, McEachran and Fechhelm 2005). Some researchers believe the Gulf of Mexico populations are a distinct subspecies (*C. s. melanus*) (McEachran and Fechhelm 2005). Mature females outnumber mature males (Hood et al. 1994), and reproduction may be limited by the availability of large mature males (Droham et al. 2007). Spawning occurs primarily in 20 to 50 m of water over sandy substrate adjacent to ledges (Droham et al. 2007). Eggs are pelagic and most often occur in open water adjacent to estuaries, but also occur in large bays (Droham et al. 2007). Larvae are pelagic until they reach 10 to 25 mm TL, at which time they settle on benthic substrates (Droham et al. 2007). Adults aggregate over low-relief structures such as limestone or coral outcroppings rather than deeper ledges as with larger serranids (Hood et al. 1994).

The rock sea bass is shorter-lived than the black sea bass and reaches a smaller maximum size (Link 1980, McEachran and Fechhelm 2005). Rock sea bass frequent a wide range of water depths (10 to 172 m) and are most common over soft substrates such as soft mud and sand (McEachran and Fechhelm 2005). Due to its smaller size and lesser economic importance, there are little reproductive data available on rock sea bass, and what data are available suggests the species has reproductive habits similar to other members of the genus (Link 1980).

Effects Determination

Although a large number of sea bass (*n* = 662) were caught in 2010 trawl samples, evidence suggests these fishes were not associated with hardbottom or reef structure. Contents of trawl samples and mollusk dredge samples, combined with results of reconnaissance sled video footage, suggest that broken shells along with dense colonies of transverse arks and to a lesser extent, shingle tube worms, are the main sources of structure over much of the project area. The sea basses are thought to be utilizing soft substrates along with these very low profile substrates in the area. The fact that black sea bass and rock sea bass utilize soft and shelly bottoms is established in the literature (e.g., McEachran and Fechhelm 2005, Drohan et al. 2007, Kells and Carpenter 2011). The project area should continue to provide suitable substrate for the black sea bass and rock sea bass and, therefore, only minimal effects are expected.

Given the paucity of hardbottom and higher-relief structure within the project area, larger serranids such as gag, black grouper (*Mycteroperca bonaci*), red grouper (*Epinephelus morio*), and Goliath grouper (*Epinephelus itajara*) are expected to occur only in low numbers. For the reasons stated above, only minimal impacts to managed serranids are expected.

Snappers (Lutjanidae)

Lutjanids are typically epibenthic and nocturnal predators inhabiting inshore waters to depths of approximately 550 m (Anderson 2002, McEachran and Fechhelm 2005). Adult lutjanids typically inhabit reef structure or rocky areas (Anderson 2002). The majority of lutjanid species prey on crustaceans and fishes, although some have specially adapted gill rakers that allow them to strain zooplankton (Anderson 2002). Spawning occurs in summer for continental populations, including those off Florida (Anderson 2002). Spawning probably occurs at night for most species and may sometimes coincide with spring tides (Anderson 2002). Females spawn multiple times during a given season (Anderson 2002). Eggs are fertilized near-surface after an ascending courtship ritual (Anderson 2002). Eggs and larvae are pelagic (Anderson 2002), as with most other members of this FMP. Larvae are photo-sensitive, avoiding the surface during the day but distributing themselves more evenly after dark (Anderson 2002). Lutjanids exhibit K-selected life history traits, including slow growth and late maturation (Anderson 2002).

The only lutjanid collected during spring and fall 2010 trawl sampling was the red snapper, which was caught only during fall sampling and in small numbers (*n* = 14) in and around Sites 1 and 2 (ANAMAR 2011). A juvenile red snapper, measuring 75-mm SL, was collected by roller trawl near Site 3, but results from roller trawls were omitted from analyses (see ANAMAR 2011 for details). All were juveniles (45 to 86 mm SL) based on lengths given in Wilson and Nieland

(2001). These fish represent summer 2010 recruits and were less than about 90 days old based on otolith-based growth estimates from a Gulf of Mexico population presented in Geary et al. (2007). However, growth rates are known to vary among populations (in Geary et al. 2007).

Juvenile red snapper (*Lutjanus campechanus*)
captured by trawl in fall 2010
Photo by Jason C. Seitz

Although previous research suggests that structured habitat provides essential nursery areas of age-0 red snapper, recent work suggests structure may not be as important as once thought (Geary et al. 2007). In a study in the northern Gulf of Mexico off Texas, Geary et al. (2007) found that newly settled red snapper use a variety of habitats, including soft sediment devoid of structure (Geary et al. 2007). These researchers found that post-settled red snapper switch to structured habitat with increasing size (Geary et al. 2007). McEachran and Fechhelm (2005) also note the use of soft substrate (i.e., sand, mud) by juveniles. The findings of Geary et al. (2007) and statements in McEachran and Fechhelm (2005) explain why the age-0 red snapper were caught over soft, non-structured substrate in and around the project area. Further, these findings suggest that age-0 red snapper would find suitable habitat even if fine-grained dredged material has been disposed at the site.

Effects Determination

A review of red snapper management efforts in the Gulf of Mexico by Hood et al. (2007) stated that management success was limited in part to high levels of juvenile mortality associated with shrimp trawling. Based on results of the Hood et al. (2007) study, it appears that designation of a new ODMDS may provide a haven for juvenile red snapper considering that shrimp trawlers are known to avoid disposal sites for fear of net damage (J. Thomas, *pers. comm.*). A new disposal site would increase the area avoided by shrimp trawlers and could potentially decrease trawler bycatch mortality of juvenile red snapper and other managed species affected by the shrimp fishery. Mature-sized red snapper are unlikely to inhabit the project area given the relatively shallow water depths and lack of suitable structure (Anderson 2002, McEachran and Fechhelm 2005). Adult gray snapper (*Lutjanus griseus*) are likely to occasionally inhabit the project area but are not likely to take up residence due to the paucity of suitable structure (McEachran and Fechhelm 2005). For the reasons stated above, minimal to no impacts to managed lutjanids are expected.

Porgies (Sparidae)

Sparids occur over the continental or insular shelves in both tropical and temperate seas worldwide (McEachran and Fechhelm 2005). In the western central Atlantic, there are 19 species of sparids belonging to six genera (McEachran and Fechhelm 2005). Many species are either protandric or protogynic hermaphrodites, while some have functional sets of both sex organs at the same time (McEachran and Fechhelm 2005). Eggs and larvae are pelagic (McEachran and Fechhelm 2005). In a scoping letter response to USEPA and USACE, NMFS expressed concern that sheepshead (*Archosargus probatocephalus*) may be affected by the proposed action (Appendix A of the EIS).

A total of 59 longspine porgy were captured during fall 2010 trawl sampling (ANAMAR 2011), most of which were apparently mature based on lengths given in Geoghegan and Chittenden (1982). One longspine porgy was collected during October 1985 trawl sampling in and around the Fernandina Beach ODMDS (Continental Shelf Associates 1986). Fish resembling scup (*Stenotomus chrysops*) were identified in sled video footage within the project area, although turbidity and camera tow speed prevented a positive identification. Scup were collected during March and December 1979 trawl sampling in and around the Jacksonville ODMDS (USEPA 1983), although the number collected was not reported.

Effects Determination

Longspine porgy favor soft substrate such as sand and mud (McEachran and Fechhelm 2005). Since dredged material is likely to increase the amount of fine sediment within the site, this species should continue to find suitable habitat in the area. Scup may also inhabit the project area but not in large numbers considering the species is more structure-oriented than the longspine porgy (Steimle et al. 1999, McEachran and Fechhelm 2005). For similar reasons, sheepshead probably only inhabit the area in low numbers. As previously stated, designation of a new disposal site may reduce bycatch mortality of these and other managed species in shrimp trawls. For the reasons stated above, only minimal effects to sparids are expected.

Jacks (Carangidae)

Eight species of carangids are managed within the Snapper-Grouper FMP (SAFMC [no date]). Carangids are most often found in schools (Smith-Vaniz 2002). Most species inhabit marine waters of the continental shelf or are found in estuaries, although some species are pelagic and live in oceanic waters beyond the shelf (Smith-Vaniz 2002). The juveniles of many species often use jellyfish and pelagic sargassum as shelter (Smith-Vaniz 2002, J.C. Seitz [ANAMAR] *pers. obs.*).

Although it is possible for any of the eight managed jacks to occur within the project area, the blue runner (*Caranx crysos*) and crevalle jack (*Caranx hippos*) are the most likely to occasionally inhabit the project area given their relative abundance in Florida. Pelagic structures such as the moon jelly (*Aurelia aurita*) and sargassum, which may occasionally drift through the area, may harbor juvenile jacks. Trawl sampling results indicate an abundance of suitable forage invertebrates and fishes for the larger jack species, but the project area lacks large structures favored by these species.

Effects Determination

Numbers of managed jacks within the project area are thought to be low considering no managed jacks were caught during the spring and fall 2010 surveys or in previous surveys of nearby sites. The project area lacks large structures favored by the larger jack species. For the reasons stated above, minimal to no impacts to managed jacks are expected.

Triggerfishes (Balistidae)

Balistids are solitary (Matsuura 2002) and the three managed species belong to a separate order (Tetraodontiformes) from the remaining 70 managed species (Perciformes) included in this FMP. Although many triggerfishes are demersal and associate with rocks and coral reefs, other species are pelagic, living in the upper water column and associated with drifting debris (Matsuura 2002). Triggerfishes are known to eat hard-shelled invertebrates such as sea urchins, but may also consume algae, zooplankton, mollusks, and crustaceans (McEachran and Fechhelm 2005). Eggs are benthic and there is no pelagic stage except in a few species (McEachran and Fechhelm 2005).

The gray triggerfish (*Balistes capriscus*) inhabits structure such as coral reefs, rock outcroppings, seagrass beds, and sandy adjacent areas (Matsuura 2002). This species is seldom if ever abundant (Matsuura 2002). The queen triggerfish (*Balistes vetula*) has similar habitat preferences as the gray triggerfish. The ocean triggerfish (*Canthidermis sufflamen*) is a pelagic species most often observed over offshore reefs in clear water (McEachran and Fechhelm 2005). The ocean triggerfish eats large zooplankton while the other two species feed on benthic invertebrates (McEachran and Fechhelm 2005). All three species are prized food fishes. The queen triggerfish is also marketed in the marine aquarium trade.

Effects Determination

The project area does not offer suitably clear water or reef habitat for the ocean triggerfish. Similarly, the gray and queen triggerfishes are not likely to find suitable high-relief structure in the project area but may occasionally occur there. For the reasons stated above, minimal to no impacts to triggerfishes are expected.

Wrasses (Labridae)

Labrids live over a wide variety of habitats, depending on the species, from seagrass beds and sand bottom to coral reefs and rocky areas (Westneat 2002). Some species occur in the upper water column above reefs (Westneat 2002). Most species are protogynic hermaphrodites (McEachran and Fechhelm 2005). Feeding occurs during the day and most species eat benthic invertebrates and fishes, although others feed on zooplankton or even consume ectoparasites off larger fishes (McEachran and Fechhelm 2005). Two labrids, the hogfish (*Lachnolaimus maximus*) and the puddingwife (*Halichoeres radiatus*), are included in the Snapper-Grouper Complex FMP.

The hogfish is a large species inhabiting deep water over reefs and open substrates having abundant soft corals (McEachran and Fechhelm 2005). The puddingwife occurs from nearshore to a depth of 50 m and lives in reef habitat (Kells and Carpenter 2011).

Effects Determination

Although there is no evidence of the occurrence of these wrasses within the project area, they cannot be ruled out. Trawl data indicate only a small amount of soft corals, which may be suitable habitat for hogfish. It is doubtful that the reef-oriented puddingwife would find suitable habitat in the project area. For the reasons stated above, minimal to no impacts to hogfish and puddingwife are expected.

Atlantic Spadefish (*Chaetodipterus faber*)

The Atlantic spadefish is known to form large schools and inhabit a variety of different nearshore habitats, including natural and anthropogenic structure, and even sandy beaches (Burgess 2002). Juveniles often float in a horizontal position near-surface, where they resemble leaves (Burgess 2002). Prey items include benthic and pelagic invertebrates (Burgess 2002), and the species is known to consume cannonball jellyfish (*Stomolophus meleagris*) (Hayse 1990). Atlantic spadefish are common throughout Florida.

Males and females reach maturity by age-1 (Hayse 1990). Spawning occurs offshore from May to September and most spawning takes place in May according to a South Carolina study (Hayse 1990). Females can spawn multiple times in a season (Hayse 1990). Juveniles subsequently inhabit estuaries (at least in summer) (Hayse 1990). Off Florida, juveniles inhabit water depths of 20 m or less during summer but move into deeper water (28 to 56 m) during winter (Hayse 1990). Off South Carolina, older (age-2+) mature individuals commonly inhabit artificial and natural reefs in summer, and the species is thought to migrate into deep water during winter (Hayse 1990).

Atlantic spadefish were collected in the fall 2010 trawl samples (n = 5) (ANAMAR 2011) and may have attained sexual maturity based on lengths given in Hayse (1990). Three Atlantic spadefish were collected in October 1985 trawl sampling in and north of the Fernandina Beach ODMDS (Continental Shelf Associates 1986). No spadefish were collected during March and December 1979 trawl sampling in and around the Jacksonville ODMDS (USEPA 1983).

Effects Determination

It is possible that this species migrates elsewhere during cooler months as none were caught in spring 2010 and March and December 1979 trawl catches in nearby areas. When present, the species appears to occur in low densities based on trawl sampling results (ANAMAR 2011). For these reasons, only minimal effects on Atlantic spadefish are expected.

2.5.6 Coastal Migratory Pelagics

The Coastal Migratory Pelagics FMP consists of cobia (*Rachycentron canadum*) and four scombrid species (cero [*Scomberomorus regalis*], little tunny [*Euthynnus alletteratus*], king mackerel [*Scomberomorus cavalla*], and Spanish mackerel [*Scomberomorus maculatus*]) (SAFMC [no date]).

SAFMC (1998) defines EFH for this group as a whole. Habitat deemed essential consists of sandy shoals associated with capes and offshore sandbars, high-profile rocky bottom, and the windward sides of barrier islands (SAFMC 1998). Sargassum habitat is also included as EFH for coastal migratory pelagics (SAFMC 1998). These features can be found from inshore out to the Gulf Stream (SAFMC 1998). Coastal inlets are included as EFH, as are any state-designated nursery areas of particular importance (SAFMC 1998). The Gulf Stream is itself EFH as it allows dispersal of these fishes, especially during the larval stage (SAFMC 1998).

Although SAFMC (1998) treats this group as a whole when defining EFH, there is additional EFH assigned to certain species within the group. EFH specific to cobia includes high salinity bays, estuaries, and seagrass beds (SAFMC 1998). EFH for king mackerel, Spanish mackerel, and cobia include the South Atlantic and Mid-Atlantic bights (SAFMC 1998). The Gulf Stream is EFH for this group given its important role in larval dispersal (SAFMC 1998).

The NOAA EFH Mapper identifies EFH for the Coastal Migratory Pelagics group to include a circular polygon within the vicinity of the project area (NOAA Fisheries 2011). The EFH polygon surrounds St. Johns Bar Cut (NOAA Fisheries 2011). Another EFH polygon surrounds the entrance to Nassau Sound (NOAA Fisheries 2011). Additional delineations appear in portions of the St. Johns and Nassau rivers (NOAA Fisheries 2011). EFH is not broken down by life stage (NOAA Fisheries 2011). No HAPC is currently identified in the EFH Mapper (NOAA Fisheries 2011).

Of the Coastal Migratory Pelagics group, only the Spanish mackerel was collected during spring and fall 2010 trawl sampling (ANAMAR 2011). One post-larva (53 mm SL) was collected during fall south of Site 2 (ANAMAR 2011) (see photo that follows). This individual must have hatched in spring or summer of 2010 based on size classes and spawning times in Powell (1975). No members of this FMP were collected during October 1985 trawl sampling in and around the Fernandina Beach ODMDS (Continental Shelf Associates 1986) or during March and December 1979 trawl sampling in and around the Jacksonville ODMDS (USEPA 1983).

Cobia (*Rachycentron canadum*)

In a scoping letter response to USEPA and USACE, NMFS expressed concern that the cobia may be adversely affected by the proposed action (Appendix A of the EIS). The species is distributed along both coasts of Florida (Adams et al. 2003). Cobia migrate southward and into deeper water during fall and winter and return to nearshore waters in spring and summer (Adams et al. 2003). Off the southeastern United States including Florida, the species spawns from April to September (Adams et al. 2003). Cobia grow fast considering their large size and females reach maturity around age-2 (Adams et al. 2003). As cobia increase in size, their choice of focal prey switches from portunid crabs to predominantly forage fishes (Adams et al. 2003). Juvenile cobia use the St. Johns River, where they are common from June through August (SAFMC 1998). Cobia are found above structured habitat such as reefs and rocky substrates in open continental shelf waters (Kells and Carpenter 2011) up to 1,200 m deep (Collette 2002b). The species is less often found in estuaries (Collette 2002b).

Effects Determination

The species probably moves through the area occasionally but would not find enough structure for prolonged habitation. Only minimal impacts are expected due to the paucity of structure within the project area.

Cero (*Scomberomorus regalis*)

The cero occurs along Florida's east coast from nearshore to the continental slope (Collette 2002c). This species is frequently observed over reefs and can also be found over seagrass beds (Kells and Carpenter 2011). In Florida, spawning occurs offshore during mid-summer (Finucane and Collins 1984).

Effects Determination

Only minimal impacts are expected considering the lack of suitable structure and seagrass beds.

Little Tunny (*Euthynnus alletteratus*)

The little tunny is mainly limited to continental shelf waters (Collette 2002c). This species occurs near-surface and often in association with swift currents, near shoals, and offshore islands (Collette 2002b). The species is found year-round in Florida (Collette 2002c), where anglers often refer to it as 'bonito'. Juveniles can be found off beaches (Collette 2002c).

Effects Determination

The little tunny probably occasionally inhabits the area in low numbers and, considering its pelagic habits, minimal to no effects are expected.

King Mackerel (*Scomberomorus cavalla*)

The king mackerel is a widely distributed species that occurs along both coasts of Florida (Adams et al. 2003). Spawning takes place between May and September in Florida waters, although some spawning may occur during the months before and after this time span (Adams et al. 2003). There is a paucity of data concerning the distribution and habitat usage of early life stages (Adams et al. 2003). Juveniles are found in both nearshore and offshore waters (Adams et al. 2003), and larvae have been found off Florida's east coast from May through September (Finucane et al. 1986). Photoperiod and water temperature are presumed important in inducing spawning and for the success of early developmental stages (Finucane et al. 1986). Larvae are found in temperatures of 26.3° to 31.0°C (McEachran and Fechhelm 2005). Although the species is considered migratory, resident populations are thought to occur in the Gulf of Mexico off south Florida and Louisiana (McEachran and Fechhelm 2005).

Effects Determination

Since the king mackerel is a pelagic species, it may experience short-term effects from increased turbidity. Therefore, minimal effects are expected.

Spanish Mackerel (*Scomberomorus maculatus*)

The Spanish mackerel is found in coastal and estuarine waters of Florida (Adams et al. 2003). In a scoping letter response to USEPA and USACE, NMFS expressed concern that this species may be affected by the proposed action (Appendix A of the EIS). Spawning takes place from spring through summer (Powell 1975, Adams et al. 2003), and the species is thought to spawn repeatedly in a season (Powell 1975). Larvae are found throughout the summer (Powell 1975). Florida nearshore and estuarine waters are used as juvenile nursery areas (Adams et al. 2003), including areas along unprotected beaches. Juvenile Spanish mackerel use Biscayne Bay, where they are common during May through July (SAFMC 1998).

The occurrence of Spanish mackerel in the vicinity of the project area was confirmed by collection of a single post-larva in fall 2010 south of Site 2.

Effects Determination

Considering that the species occurs in the upper water column, it is not likely to experience more than temporary effects due to increased turbidity during dredged material disposal operations. Therefore, only minimal effects are expected.

2.5.7 Large Coastal Sharks (Tables 2 and 5)

The Large Coastal Sharks FMP addresses the nurse shark (*Ginglymostoma cirratum*), seven species of carcharhinids, and three species of sphyrnids.

Large coastal carcharhinids consist of the blacktip shark (*Carcharinus limbatus*), bull shark (*C. leucas*), lemon shark (*Negaprion brevirostris*), sandbar shark (*C. plumbius*), silky shark (*C. falciformis*), spinner shark (*C. brevipinna*), and tiger shark (*Galeocerdo cuvier*) (NMFS 2009). Carcharhinids are the most economically important shark family (Castro et al. 1999). Many species are used worldwide for their meat, fins, hides, and other parts (Castro et al. 1999). These species are generally common in Florida waters, and many have important nursery areas or other EFH within the state.

Large coastal sphyrnids of this FMP consist of the great hammerhead (*Sphyrna mokarran*), scalloped hammerhead (*S. lewini*), and smooth hammerhead (*S. zygaena*). These warm-temperate sharks are widely distributed and represent important income for shark fishers around the world (Castro et al. 1999), especially considering the high value of their fins.

Table 2 provides a list of managed species. NOAA (2009) and NOAA Fisheries (2011) address EFH and HAPC for this group on a per-species basis. Table 5 outlines EFH and HAPC identified in the NOAA EFH Mapper. EFH is broken down by species below.

Nurse Shark (*Ginglymostoma cirratum*)

The nurse shark is the sole western Atlantic member of the order Orectologiformes, and it is abundant in Florida and the Caribbean (Castro 2000). Maturity is reached at between 214.0 and 214.6 centimeters (cm) TL in males and between 223 and 231 cm TL in females (Castro 2000). Mating takes place from mid-June to early July, gestation is estimated to last for five to six months, and young measure 28.0 to 30.5 cm TL at birth (Castro 2000). Brood size ranges from 21 to 50 young (Castro 2000). Females have a two-year ovarian cycle (Castro 2000). Parturition may take place over several days (Castro 2000) and occurs mostly in November (rarely as late as early December) (Castro 2000). Nurse sharks eat mainly fishes, especially grunts (Haemulidae) (Castro 2000).

Nursery areas are identified in McCandless et al. (2002) as certain large estuaries along Florida's Gulf coast and the Dry Tortugas. McCandless et al. (2002) also identified a possible secondary nursery area for juveniles (age 1+) just north of Cape Canaveral, Florida, based on capture locations. Castro (2000) found juveniles associated with shallow coral reef and grass flat habitats along Florida's east coast and in the Bahamas. Adults generally rest in structured habitat but occur over a wide variety of habitat when active (Castro 2000, Dodrill 1977). Microhabitats of juveniles reported by Castro (2000) included holes in reefs and under rocks and ledges. Dodrill (1977) reported a neonate measuring 29.0 cm TL captured close to shore at Hutchison Island (St. Lucie County), Florida, in January. Juvenile nurse sharks were landed year-round off Brevard County, Florida, while adults and sub-adults were caught only during warmer months (Dodrill 1977). NOAA (2009) indentified juvenile and adult EFH to include the project area and surrounding waters. The NOAA EFH Mapper identifies juvenile and adult nurse shark EFH to include the project area and extends north and south along the coastline, from nearshore to the edge of the continental shelf (NOAA Fisheries 2011). Neonate nurse shark EFH is not currently identified on the EFH Mapper (NOAA Fisheries 2011). No HAPC is currently identified (NOAA Fisheries 2011).

Effects Determination

The project area does not appear to include EFH for the nurse shark, although it is within EFH as mapped by NOAA Fisheries (2011). The project area appears to include only poor habitat for resting adults and earlier life stages, given the scarcity of suitable structure. Water depths appear deeper than those preferred by neonate and juvenile nurse sharks. For these reasons, only minimal impacts are expected.

<u>Blacktip Shark (*Carcharinus limbatus*)</u>

Brood size for the blacktip shark ranges from one to eight young, each measuring 55 to 60 cm TL, born in late May to early June in shallow mud-bottomed coastal nurseries from the Carolinas to Georgia (Castro et al. 1999). Reproduction is biannual (Castro et al. 1999). Neonates use water depths of from 2.1 to 6.0 m according to a study by Carlson (2002). McCandless et al. (2002) identified Cape Canaveral, Florida as a potential nursery area for neonates, young-of-year, and juveniles based on capture locations. Juveniles use both nearshore and estuarine waters (NOAA 2009). Juveniles and adults migrate north and south along the coastline, and migrations are temperature-driven (NOAA 2009).

NOAA (2009) identified neonate and young-of-year EFH to occur just north of Jacksonville, Florida. Juvenile and adult EFH was identified by NOAA (2009) to include the project area and surrounding waters and north and south along the coast. Blacktip shark EFH for all life stages appears to include the project area based on the NOAA EFH Mapper (NOAA Fisheries 2011). Neonate EFH includes Jacksonville nearshore waters and areas farther north along the coastline (NOAA Fisheries 2011). Juvenile and adult EFH includes most nearshore and inshore waters along the Atlantic and Gulf coastal states (NOAA Fisheries 2011). The NOAA EFH Mapper does not currently identify any blacktip shark HAPC (NOAA Fisheries 2011). According to NOAA (2009), blacktip neonate, young-of-year, and juvenile EFH includes the inshore and nearshore areas around Jacksonville.

Effects Determination

Neonates appear to use water shallower than depths found in the study area based on depths reported in Carlson (2002). Juveniles and adults are expected to be able to successfully navigate out of the area during disposal events. For these reasons, only minimal impacts are expected for the blacktip shark.

<u>Bull Shark (*Carcharhinus leucas*)</u>

Reproductive habits for the bull shark are not well known but breeding is believed to be biannual (Castro et al. 1999). Gestation is estimated at 10 to 11 months (Castro et al. 1999). Brood size is 1 to 10 young, each measuring approximately 75 cm TL (Castro et al. 1999). Gulf of Mexico estuaries provide nursery areas for this species (Castro et al. 1999), as do coastal lagoons along Florida's Atlantic coast (Snelson et al. 1984). Estuarine habitats used by young bull sharks often have very low salinity (Castro 1999). Curtis (2008) stated that the northern portion of Indian River Lagoon, Florida, appears to be a nursery area. Dodrill (1977) found gravid female bull sharks along Melbourne Beach (Brevard County), Florida, in late April through May, and stated that parturition takes place inside the Indian River Lagoon from May through July. Young bull sharks in inshore nurseries are susceptible to mortality during cold winters (Dodrill 1977).

NOAA (2009) identified neonate and young-of-year EFH clustered around Cape Canaveral, Florida, and does not include the Jacksonville area. Juvenile and adult EFH is identified by NOAA (2009) to include the project area and surrounding waters. The NOAA EFH Mapper identifies juvenile and adult bull shark EFH as including the project area and extending north and south from nearshore to near the edge of the continental shelf (NOAA Fisheries 2009). The nearest neonate EFH is far south of the project area, associated with the Indian River Lagoon (NOAA Fisheries 2009). No HAPC is currently identified in the EFH Mapper (NOAA Fisheries 2009).

Effects Determination

The propensity for bull sharks to inhabit turbid water (river mouths, estuaries) suggests the species can endure increased turbidity associated with disposal operations. Therefore, minimal or no effects on bull sharks are expected.

Lemon Shark (*Negaprion brevirostris*)

The lemon shark mates between late April and late May for populations off southern Brevard County, Florida (Dodrill 1977). Individuals give birth biannually, gestation lasts 10 to 12 months, parturition takes place the following spring (Dodrill 1977), brood sizes are from 5 to 17 young (Castro et al. 1999) (rarely to 21 young, Dodrill 1977), and nursery areas are in shallow mangrove habitats (Castro et al. 1999). The species is common throughout Florida.

Dodrill (1977) found that the majority of lemon sharks caught off Melbourne Beach were adult females. Brevard County catches occurred during most months of the year in Dodrill's 1977 study, although he suspected that adults may leave the area briefly during late fall and winter (Dodrill 1977). Two adults were caught by trawl during late December in 15 m depth offshore of Brevard County (Dodrill 1977). McCandless et al. (2002) identified nursery areas within the Gulf of Mexico, off Georgia (St. Andrews Sound), and along South Carolina (North Edisto Estuary) but did not identify any along Florida's east coast.

NOAA (2009) identifies neonate and young-of-year EFH to be absent from Florida's east coast except along the Florida Keys. Juvenile and adult EFH are identified by NOAA (2009) to include the project area and surrounding waters. The NOAA EFH Mapper identifies lemon shark juvenile and adult EFH to include the project area along with nearshore to offshore waters (NOAA Fisheries 2011). The nearest neonate EFH is far south of the project area in nearshore and inshore waters of the Florida Keys and Florida Bay (NOAA Fisheries 2011). No HAPC is currently identified in the EFH Mapper (NOAA Fisheries 2011).

Effects Determination

Juveniles and adults can avoid the project area during disposal operations. Therefore, only minimal effects on lemon sharks are expected.

Sandbar Shark (*Carcharhinus plumbeus*)

The sandbar shark is common to abundant throughout the western central Atlantic (Castro 1993) and is heavily sought after by the Florida shark longline fleet due mostly to its large fins, which command a high price for use in shark fin soup. Western Atlantic sandbar sharks have a reproductive cycle less frequent than every two years (Piercy 2009). Gestation lasts about 12 months, with a mean brood size of between 10 (Piercy 2009) and 14 young (Castro et al. 1999). Parturition takes place in late June in Florida (Piercy 2009). Neonates measure approximately 60 cm TL and use shallow coastal waters from Long Island, New York, to Cape Canaveral, Florida, as nurseries (Castro et al. 1999). The young avoid water temperatures below about 18°C (Castro 1983). Survival of juveniles is thought to have the greatest impact on population growth (Piercy 2009).

Springer (1960) suggested that the principal nursery areas of the western Atlantic include relatively shallow water from Long Island to Cape Canaveral. Springer (1960) further suggested that secondary nursery areas include the northwestern Gulf of Mexico near the mouth of the Mississippi River. McCandless et al. (2002) identified nursery areas in the western Atlantic, none of which were found off Florida's east coast. Dodrill (1977) did not record any sandbar sharks smaller than 1784 mm TL during his extensive survey of Melbourne Beach, Florida. The nearest neonate and young-of-year EFH identified by NOAA (2009) is located in southern Georgia nearshore areas including an area approaching or within the project area. Juvenile and adult EFH is identified by NOAA (2009) to include the project area and surrounding waters, and extending north and south along the coast. Sandbar shark EFH for all combined life stages includes the project area and extending north and south from nearshore to the outer continental shelf according to the NOAA EFH Mapper (NOAA Fisheries 2011). Neonate sandbar shark EFH is identified in the vicinity of the project area and continues north in nearshore waters (NOAA Fisheries 2011). The nearest HAPC is located off North Carolina and Virginia (NOAA Fisheries 2011).

Effects Determination

Sandbar sharks probably occur in the project area only during the cooler months. Juveniles and adults are expected to avoid the area during disposal operations, and any effects related to increased turbidity would be temporary. For these reasons, only minimal impacts to the sandbar shark are expected.

Spinner Shark (*Carcharhinus brevipinna*)

The spinner shark has a biannual reproductive cycle (Castro et al. 1999). Neonates measure 60 to 75 cm TL and are born in late May to early June (Castro et al. 1999). Brood size is 6 to 12 young (Castro et al. 1999). Nursery areas are shallow coastal waters (Castro et al. 1999). Dodrill (1977) recorded juveniles and adults in small numbers during his extensive survey of the sharks off southern Brevard County, Florida. However, Dodrill (1977) concluded that the species is uncommon in the area. The blacktip shark is frequently mistaken for the spinner shark by Florida anglers (J.C. Seitz [ANAMAR] *pers. obs.*), as the two species share many of the same characteristics.

McCandless et al. (2002) included Cape Canaveral and nearby areas as neonate, young-of-year, and juvenile nursery habitat. NOAA (2009) identifies neonate, young-of-year, juvenile, and adult EFH to include the project area and surrounding waters for a distance of several miles north and south along the coast. Spinner shark EFH is identified for all combined life stages to include the project area and extending north and south from nearshore to outer continental shelf waters (NOAA Fisheries 2011). The NOAA EFH Mapper does not currently identify HAPC for the spinner shark (NOAA Fisheries 2011).

Effects Determination

The spinner shark may not be a common species in Florida nearshore waters, and some reports of this species may be misidentified blacktip sharks. Larger juveniles and adults are expected to be able to avoid the area during disposal operations. Therefore, only minimal impacts are expected for the spinner shark.

Tiger Shark (*Galeocerdo cuvier*)

The gestation and reproductive cycle for the tiger shark is not clear, but birthing appears to take place less often than yearly (Castro et al. 1999). Length of gestation is unknown but may be more than 12 months (Castro et al. 1999). Broods consist of 35 to 55 young, each measuring 68 to 85 cm TL (Castro et al. 1999). The nearest nursery area identified by McCandless et al. (2002) is off South Carolina. NOAA (2009) identified neonate, young-of-year, and juvenile EFH to include the project area and surrounding waters. Adult EFH appears to approach, but not include, the project area based on NOAA (2009). Tiger shark EFH for all life stages is identified in the NOAA EFH Mapper to include the project area and extends beyond the continental slope (NOAA Fisheries 2011). No HAPC is currently identified in the EFH Mapper (NOAA Fisheries 2011).

Effects Determination

Larger juveniles and adults are expected to be able avoid the area during disposal operations. Therefore, only minimal impacts are expected for the tiger shark.

Great Hammerhead (*Sphyrna mokarran*)

The great hammerhead has a 11 month gestation period, after which 20 to 40 young are born, each measuring about 67 cm TL (Castro et al. 1999). This very large species has a biannual reproductive cycle (Castro et al. 1999). McCandless et al. (2002) included only Gulf of Mexico estuaries as nurseries. Dodrill (1977) found gravid females among the 24 great hammerheads he recorded off southern Brevard County, Florida, although no neonates or young-of-year were recorded there. McCandless et al. (2002) identified nursery areas to occur within the Gulf of Mexico but not off Florida’s east coast. Great hammerhead EFH is identified for all combined life stages to include the project area and extending farther north and south along the coast, from nearshore waters to the outer continental shelf (NOAA 2009, NOAA Fisheries 2011). No HAPC is currently identified by NOAA (NOAA 2009, NOAA Fisheries 2011).

Effects Determination

Juveniles and adults are expected to be able to avoid the area during disposal operations, and any effects related to increased turbidity would be temporary. The designation of a dredged material disposal site may help decrease bycatch mortality of neonates and young-of-year because shrimp trawlers are likely to avoid this area. For these reasons, only minimal effects are expected for the great hammerhead.

Scalloped Hammerhead (*Sphyrna lewini*)

The scalloped hammerhead has an annual reproductive cycle (Castro et al. 1999). Gestation takes 9 to 10 months and brood size is 15 to 31 young, each of which measures between 38 and 45 cm TL (Castro et al. 1999). Shallow coastal waters are used as nurseries (Castro et al. 1999). McCandless et al. (2002) included the northeast Florida coast south to Cape Canaveral, Florida, as neonate, young-of-year, and juvenile nursery areas. NOAA (2009) identified neonate and young-of-year EFH to include coastal nearshore waters from southern North Carolina to the Atlantic coast of central Florida, including the project area. NOAA (2009) also identified juvenile and adult EFH to include the project area and extending north and south along the coast and out to the continental slope. The NOAA EFH Mapper identified scalloped hammerhead EFH for all combined life stage to include the project area and extending north and south along the coastline (NOAA Fisheries 2011). No HAPC is currently identified in the EFH Mapper (NOAA Fisheries 2011).

Effects Determination

Juveniles and adults are expected to be able to avoid the area during disposal operations, and any effects related to increased turbidity would be temporary. The designation of a dredged material disposal site may help decrease by-catch mortality of neonates and young-of-year because shrimp trawlers are likely to avoid this area. For these reasons, only minimal effects are expected for the scalloped hammerhead.

2.5.8 Small Coastal Sharks (Tables 2 and 5)

Small coastal carcharhinids include the Atlantic sharpnose shark (*Rhizoprionodon terraenovae*), blacknose shark (*Carcharhinus acronotus*), and finetooth shark (*Carcharhinus isodon*) (NMFS 2009). These species are abundant along the U.S. east coast (Castro et al. 1999). The Atlantic sharpnose shark is sometimes used for bait by shark longline fishers seeking larger shark species. These fishers often refer to this species as the “puppy shark”. The bonnethead (*Sphyrna tiburo*) is the only sphyrnid included in this FMP.

Atlantic Sharpnose Shark (*Rhizoprionodon terraenovae*)

In a scoping letter response to USEPA and USACE, NMFS expressed concern that the Atlantic sharpnose shark may be impacted by the proposed action (Appendix A of the EIS). Mating takes place in late June and there is an 11- to 12-month gestation period (Castro et al. 1999). Parturition occurs in shallow coastal waters of 9 m depth or less (Castro 1993). Brood size is from four to seven young, each measuring 65 to 80 cm TL (Castro et al. 1999). McCandless et al. (2002) identified neonate, young-of-year, and juvenile nursery areas to include the northeastern Florida coast south to Cape Canaveral. NOAA (2009) and NOAA Fisheries (2011) identify Atlantic sharpnose shark neonate, young-of-year, juvenile, and adult EFH to include the project area and extending both north and south along the coast. EFH extends along the continental shelf on both sides of Florida and along adjacent states (NOAA 2009, NOAA Fisheries 2011). No HAPC is currently identified in the EFH Mapper (NOAA Fisheries 2011).

Effects Determination

Atlantic sharpnose sharks probably occur in the project area because this species is abundant throughout Florida’s nearshore waters. Therefore, it may be impacted by dredged material disposal activities. It is unknown whether Atlantic sharpnose sharks would avoid the area during disposal events or would actively feed on the temporarily displaced epibenthic fishes and invertebrates during such events. The species is frequently seen as bycatch in shrimp trawl fisheries, and large numbers of neonates have been observed dead in such fisheries (Castro 1993). Populations inhabiting the project area are expected to experience a decrease in shrimp-trawl-related mortality once the site is designated as an ODMDS. It is expected that any negative effects of the proposed action will be partially mitigated by decreased bycatch mortality, and thus only a minor overall impact is expected for the Atlantic sharpnose shark.

Blacknose Shark (*Carcharhinus acronotus*)

The blacknose shark was estimated by Dodrill (1977) to have a 10- to 11-month gestation period and a biannual reproductive cycle. Brood size is three to six young, each measuring about 50 cm TL (Castro 1983). Nursery areas include the shallow coastal waters of South Carolina (Castro 1983). No neonates or young-of-year were observed during an extensive survey of a Brevard County (Florida) beach, and the 45 specimens captured during the survey ranged from 108.8 to 130.5 cm TL (Dodrill 1977), suggesting that the area does not represent a nursery ground. McCandless et al. (2002) identified nursery areas for this species, but none were identified on Florida's east coast. Blacknose shark juvenile and adult EFH is identified by NOAA (2009) and NOAA Fisheries (2011) to include the project area and extending along both Florida coastlines from nearshore to approaching the edge of continental shelf. The nearest neonate EFH is several miles north of the project area along the coastline (NOAA 2009, NOAA Fisheries 2011). No HAPC is currently identified by NOAA (NOAA 2009, NOAA Fisheries 2011).

Effects Determination

Larger juveniles and adults are capable of avoiding the site if conditions prove adverse during disposal events, as the species is a powerful swimmer (Dodrill 1977). However, it remains unknown whether blacknose sharks would avoid the area during disposal events or would actively feed on the temporarily displaced epibenthic invertebrates and demersal fishes during such events. For these reasons, only minimal impacts are expected for the blacknose shark.

Finetooth Shark (*Carcharhinus isodon*)

Dodrill (1977) reported the finetooth shark off Brevard County (Florida) beaches only during cooler months, from November to April, and suggested the species migrates north during warmer months. Finetooth sharks have a biannual reproductive cycle (Castro et al. 1999). Brood size is two to six young, each measuring between 48 and 58 cm TL (Castro et al. 1999). Nursery areas are in shallow coastal waters (Castro et al. 1999), and the population off Florida's east coast may migrate to the Carolinas to give birth in May and early June (Castro 1993). Nursery areas identified by McCandless et al. (2002) did not include Florida's east coast.

Finetooth shark neonate and young-of-year EFH identified by NOAA (2009) and by the NOAA EFH Mapper (NOAA Fisheries 2011) approaches or includes the project area and extends north along the coastline to Georgia and beyond. The NOAA neonatal and young-of-year EFH geographic range information conflicts with the data presented by Castro (1993). Juvenile and adult EFH includes the project area along with much of Florida's east coast nearshore waters (Castro 1993). No HAPC is currently identified in the EFH Mapper (NOAA Fisheries 2011).

Effects Determination

Finetooth sharks may be absent from the project area during warm months, from late spring to fall, based on results presented by Dodrill (1977). It is unknown whether finetooth sharks would avoid the area during disposal events or would actively feed on the temporarily displaced epibenthic fishes and invertebrates during such events. Since the species only inhabits the area during cooler months, only a minimal impacts are expected for the finetooth shark.

Bonnethead (*Sphyrna tiburo*)

In a scoping letter response to USEPA and USACE, NMFS expressed concern that the bonnethead may be affected by the proposed action (Appendix A of the EIS). The species prefers water temperatures above 21°C and depths of 10 to 80 m (Bester 2011). Bonnetheads have a short (4.5 to 5 months) gestation period and an annual reproductive cycle (Castro et al. 1999). Brood size is 8 to 12 young (Castro et al. 1999). Neonates measure 27 to 35 cm TL (Castro et al. 1999).

McCandless et al. (2002) identified neonate, young-of-year, and juvenile nursery areas to include the northeastern coast of Florida south to Cape Canaveral. Neonate, juvenile, and adult EFH identified by the NOAA EFH Mapper (NOAA Fisheries 2011) and NOAA (2009) includes the project area and extends along the shallow coastal and inshore waters of the Atlantic and Gulf coasts of Florida. No HAPC is currently identified by NOAA (NOAA 2009, NOAA Fisheries 2011).

Effects Determination

Results of trawl sampling conducted in spring and fall 2010 suggest abundant prey availability for bonnetheads, including crustaceans and forage fishes (ANAMAR 2011). Given that ample forage is available and that the project area is within the preferred depth range for bonnetheads, the species is likely to utilize the area (at least during warm months) and may be impacted by dredged material disposal activities. However, the bonnethead shark may simply avoid the area during unfavorable conditions such as increased turbidity. Conversely, the species may take advantage of the temporary displacement of benthic invertebrates and actively feed during disposal events. For these reasons, along with the possibility that the species may experience a decrease in shrimp trawl-related mortality, only minimal impacts are expected for the bonnethead.

2.5.9 Prohibited Sharks (Tables 2 and 5)

Two odontaspids are included here, the bigeye sand tiger (*Odontaspis noronhai*) and the sand tiger (*Carcharias taurus*) (NMFS 2009). The white shark (*Carcharodon carcharias*) and the longfin mako (*Isurus paucus*) are the only lamnids included in the Prohibited Sharks group (NMFS 2009). Prohibited carcharhinids consist of the bignose shark (*Carcharhinus altimus*), Caribbean reef shark (*C. perezi*), Caribbean sharpnose shark (*Rhizoprionodon porosus*), dusky shark (*C. obscurus*), Galapagos shark (*C. galapagensis*), narrowtooth shark (*C. brachyurus*), night shark (*C. signatus*), and the smalltail shark (*C. porosus*) (NMFS 2009). Only species likely to occur within the project area are discussed below.

Sand Tiger (*Carcharias taurus*)

The sand tiger is extremely limited in terms of reproductive potential (Castro et al. 1999). The species likely has a biannual reproductive cycle, although data are lacking (Castro et al. 1999). Brood size is limited to two neonates, each measuring about 100 cm TL (Castro et al. 1999). Embryos engage in oophagy and intrauterine cannibalism, limiting brood size to one per uterus (Castro 1983). Birthing may take place in March and April off the U.S. coast (Castro et al. 1999). The nursery areas are not known but birthing may occur over a wide area (Castro et al.

1999). Dodrill (1977) reported two gravid females caught off southern Brevard County, Florida, in June and July, 1976. Most nearshore captures off Florida's east coast are in warm months, and the species is suspected to move into deeper water in fall (Dodrill 1977). Springer (1963) reported mating scars on females caught during summer off Salerno, Florida. McCandless et al. (2002) identified nursery areas along the northeastern U.S. coast and found none in Florida waters. Sand tiger adult EFH includes the vicinity of the project area in shallow water off Jacksonville (NOAA 2009, NOAA Fisheries 2011). Juvenile EFH occurs just south of the project area (NOAA 2009, NOAA Fisheries 2011). Neonate EFH consist of discrete polygons located to the north and south of the project area, but not including the project area (NOAA 2009, NOAA Fisheries 2011). No HAPC is currently identified (NOAA 2009, NOAA Fisheries 2011).

Effects Determination

Juvenile and adult sand tigers are expected to be able to avoid the site during dredged material disposal operations. For this reason, only minimal impacts are expected for the sand tiger.

White Shark (*Carcharodon carcharias*)

The white shark occurs worldwide in temperate waters but is not considered common anywhere (Compagno et al. 2005). Occurrences along Florida's continental shelf waters are mainly during the cold months when the surface water temperature drops below 22°C (Adams et al. 1994). The species is considered rare south of Cape Hatteras, North Carolina (Castro 1983, Casey and Pratt 1985, Adams et al. 1994). White shark populations of the western Atlantic may be principally scavengers as adults, feeding extensively on whalefall (Castro 1983). It is difficult to assess the abundance of this species as it cannot be sampled with conventional gear due to its great size and strength (Springer 1939).

In Florida, the species has been recorded since at least the winter of 1937–1938, when an approximately 4.6-m TL female was captured off Sarasota in the Gulf of Mexico (Springer 1939). Another Gulf of Mexico record is a 4.7-m TL female that was entangled in a shark set-line off Englewood, Florida, in February 1939 (Springer 1939). This individual had consumed two large (1.8 to 2.1-m TL) sandbar sharks it had torn from hooks of the same gear before it became entangled (Springer 1939). This female did not hold embryos (Springer 1939). On January 12, 2005, Jessica Taylor of the New England Aquarium photographed a white shark feeding on a north Atlantic right whale (*Eubalaena glacialis*) carcass off southern Georgia at 30° 52.1 N by 81° 06.1 W (T.D. Pitchford *pers. comm.*, M. Zani *pers. comm.*). Additional white shark sightings have occurred as recently as March 2011 off southern Georgia according to reports and images provided by members of the north Atlantic right whale aerial survey team.

Few gravid females have ever been captured, and reproductive habits are poorly known (Castro et al. 1999). Gestation is estimated at 12 months and the reproductive cycle is every two to three years (Compagno et al. 2005). Embryos are oophagous (Compagno et al. 2005). Brood size is 2 to 10 young (Castro et al. 1999) (possibly to 14; Compagno 2002), and young measure 100 to 165 cm TL (Compagno 2002). Young white sharks prey mostly on small fishes but consume increasingly larger prey (including marine mammals) as they get older (Castro 1983, Compagno et al. 2005), assisted by ontogenetic changes in dental morphology. Although the species is often considered to be imperiled and subject to overfishing, no evidence of a population decrease was found by Castro et al. (1999) despite an extensive literature review.

White shark nursery areas were not identified in an overview of the shark nursery areas of the U.S. east coast in McCandless et al. (2002). Castro et al. (1999) stated that nursery habitat and locations remain unknown, but that nurseries will likely be found in the warmer parts of the range in deep water. NOAA (2009) identified EFH for all combined life stages to include the project area from nearshore to beyond the continental slope. The NOAA EFH Mapper identifies EFH of all combined life stages to include the project area and surrounding areas (NOAA Fisheries 2011). White shark HAPC is not identified in the EFH Mapper (NOAA Fisheries 2011). Benthic habitat does not appear to be important to this epipelagic species, except when such habitat offers suitable prey. It is possible that this species is attracted to the area during the calving season for the north Atlantic right whale and during whale stranding events.

Effects Determination

No effects are expected because this species is not common and is not expected to occur within the project area with any regularity. White sharks can avoid the area during disposal activities and so no impacts are expected.

Dusky Shark (*Carcharhinus obscurus*)

A total of 31 dusky sharks were recorded by Dodrill (1977) during his extensive survey of the sharks off southern Brevard County, Florida, where the species is present during all seasons. Mating takes place in spring for populations off Florida's east coast (Dodrill 1977). The dusky shark appears to have a 16-month gestation period, although this needs confirmation (Castro et al. 1999). Brood size is 6 to 14 young, each measuring 85 to 100 cm TL (Castro et al. 1999). Castro et al. (1999) stated that birthing takes place in April and May, although Dodrill (1977) reported that parturition may extend into early summer. Nursery areas are in coastal waters, including Bulls Bay, North Carolina (Castro et al. 1999). Nursery areas identified by McCandless et al. (2002) did not include Florida waters. Neonate, young-of-year, juvenile, and adult EFH appear to include the project area and the general vicinity (NOAA 2009, NOAA Fisheries 2011). No HAPC are currently identified (NOAA 2009, NOAA Fisheries 2011).

Effects Determination

The dusky shark primarily inhabits offshore waters (Bigelow and Schroeder 1948, Bass et al. 1973), although the species is known to visit nearshore waters on occasion. Therefore, it is not expected to occur regularly within the project area. Juveniles and adults should be able to avoid the area during disposal activities. For these reasons, only minimal effects are expected for the dusky shark.

2.5.10 Billfishes (Tables 2 and 5)

Five species of istiophorids are included here: blue marlin (*Makaira nigricans*), longbill spearfish (*Tetrapturus pfluegeri*), roundscale spearfish (*Tetrapturus georgii*), sailfish (*Istiophorus albicans*), and white marlin (*Tetrapturus* [*Kajikia*] *albidus*) (NMFS 2009). Very little is known about reproduction and nursery areas of istiophorids (de Sylva 1963).

No billfishes were collected or observed during spring and fall 2010 trawl sampling (ANAMAR 2011). No billfishes were collected during October 1985 trawl sampling in and around the Fernandina Beach ODMDS (Continental Shelf Associates 1986) or during March and December 1979 trawl sampling in and around the Jacksonville ODMDS (USEPA 1983). Only the sailfish is expected to occasionally occur within the project area and is discussed below.

<u>Sailfish (*Istiophorus albicans*)</u>

The sailfish prefers a temperature range of 21° to 28°C (Nakamura 1985). This species is known to often migrate into nearshore waters and is the least oceanic of the istiophorids (Nakamura 1985, Robins and Ray 1986, Nakamura 2002). Migrations along the U.S. east coast appear to be influenced by wind and temperature (Nakamura 1985). Freeman and Walford (1976) found sailfish along Florida's east coast, including within the vicinity of the project area. Off Florida, spawning takes place near the surface in nearshore waters during warm weather, but may also occur over deep offshore waters (Nakamura 1985).

Juvenile EFH appears to include the project area (NOAA 2009, NOAA Fisheries 2011). Adult EFH is identified along the coastline just south of the project area (NOAA 2009, NOAA Fisheries 2011). Spawning EFH is located many miles south of the project area (NOAA 2009, NOAA Fisheries 2011). No HAPC is currently identified (NOAA 2009, NOAA Fisheries 2011).

Effects Determination

No effects are expected as the sailfish, an essentially oceanic species (Nakamura 1985), likely occurs in the area only occasionally during sporadic nearshore migrations (Nakamura 1985, Robins and Ray 1986).

2.5.11 Atlantic Mackerel, Squid, and Butterfish

This FMP manages stocks of two species of squid each representing a different family, the butterfish (*Peprilus triacanthus*) and the Atlantic mackerel (*Scomber scombrus*) (NMFS 2008).

<u>Longfin Inshore Squid (*Loligo pealeii*)</u>

The longfin inshore squid is the only inshore squid (Loliginidae) included in this FMP (NMFS 2008). The species is distributed in continental shelf and slope waters through much of the western Atlantic, including both coasts of Florida (Vecchione 2002, Jacobson 2005). The preferred temperature range for this species is 10° to 14°C (Vecchione 2002). Although the species is fished primarily north of Cape Hatteras, North Carolina (Vecchione 2002, Jacobson 2005), some commercial fishing also takes place in the northern Gulf of Mexico and off the Yucatán Peninsula, Colombia, and Venezuela (Vecchione 2002). Although very small planktonic paralarvae have been located in the Gulf of Maine, habitat requirements and preferred environmental parameters are poorly known for larvae (Jacobson 2005). Eggs are laid on hard substrates (e.g., rocks, shells, artificial reefs) (Vecchione 2002). Paralarvae and juveniles are said to be abundant in the upper water column (Vecchione 2002). Adults spend the day near-bottom but disperse by day to be found throughout the water column (Vecchione 2002). Longfin inshore squid may be seen at the surface during warm weather (Vecchione 2002).

The NOAA EFH Mapper does not currently identify longfin inshore squid EFH (NOAA Fisheries 2011).

Although a total of 501 squid identified to the genus *Loligo* were caught in spring and fall 2010 trawl catches, it is unknown if *L. pealeii* were among those captured because identification of squid was undertaken only as far as the genus level (ANAMAR 2011). Numbers caught per alternative site ranged from a low of 34 individuals at Site 2 to a maximum of 137 individuals at Site 3 (ANAMAR 2011). *Loligo* sp. density per 1,000 m^2 ranged from a low of 0.74 at Site 2 to a high of 4.33 at Site 3 (ANAMAR 2011). No longfin inshore squid were collected during October 1985 trawl sampling in and around the Fernandina Beach ODMDS (Continental Shelf Associates 1986) or during March and December 1979 trawl sampling in and around the Jacksonville ODMDS (USEPA 1983).

Effects Determination

Only minimal effects are expected due to disposal activities. Any adverse impacts to this species may be mitigated by a reduction in shrimp trawler effort (and consequently reduced bycatch of this species) within the newly designated disposal site.

Northern Shortfin Squid (*Illex illecebrosus*)

The northern shortfin squid is the only flying squid (Ommastrephidae) squid species included in this FMP (NMFS 2008). The species inhabits inshore waters during summer but migrates to deeper (to about 1,000 m) offshore waters towards the outer edge of the continental shelf and slope during winter (Vecchione 2002). Vertical migrations take place from near-bottom by day to throughout the water column by night (Vecchione 2002). This species is restricted to water temperatures of 0° to 15°C, with a preferred temperature range of 7° to 13°C (Vecchione 2002). The Atlantic coast of central Florida represents its southernmost range of distribution (Vecchione 2002). Egg masses are laid within the water column and are not associated with any substrate (Hendrickson and Holmes 2004). Pelagic eggs and paralarvae are transported by the Gulf Stream (Hendrickson and Holmes 2004). Adults have been found over a variety of sediment types, including a combination of sand and silt (Hendrickson and Holmes 2004). This species avoids substrates inhabited by anemones (Hendrickson and Holmes 2004).

The NOAA EFH Mapper does not currently identify northern shortfin squid EFH (NOAA Fisheries 2011).

No northern shortfin squid or any other flying squid species was collected in the spring and fall 2010 trawl samples (ANAMAR 2011) or during October 1985 trawl sampling in and around the Fernandina Beach ODMDS (Continental Shelf Associates 1986). Northern shortfin squid were reported from trawl catches made in March and December 1979 northeast of the Jacksonville ODMDS (USEPA 1983), but the number collected was not indicated. Water column temperatures during spring 2010 ranged from 15.0° to 16.8°C, while fall 2010 temperatures ranged from 27.7° to 28.6°C in and around the project area (ANAMAR 2011). Recorded fall temperatures are well above the preferred threshold for this species, while spring temperatures are at the upper limit for northern shortfin squid, suggesting that the water may be too warm for this cool-water species during a portion of the year.

Effects Determination

Only minimal effects are expected as temperatures within the project area appear to be at or beyond the upper threshold for this species during much of the year.

Butterfish (*Peprilus triacanthus*)

The butterfish occurs on both Florida coasts in its pelagic distribution but is most abundant between the Gulf of Maine and Cape Hatteras, North Carolina (Bigelow and Schoeder 1953, Cross et al. 1999). In winter, this species migrates towards the edge of the continental shelf (Cross et al. 1999). In spring, butterfish migrate towards inshore waters of southern New

England and the Gulf of Maine (Cross et al. 1999). In summer, the species can be found throughout continental shelf waters within its range, from inshore (including bays and estuaries) to approximately 200 m depth (occasionally to over 350 m) (Cross et al. 1999). Spawning is not well known but is believed to take place in the upper water column at night in offshore waters (Cross et al. 1999). Pelagic eggs and larvae have been collected in most major estuaries and coastal waters (Cross et al. 1999), suggesting that they are dispersed with currents and tides.

The NOAA EFH Mapper does not currently identify butterfish EFH (NOAA Fisheries 2011).

Butterfish were collected during spring 2010 trawl sampling (ANAMAR 2011). Of the 80 individuals collected, mean size was 80 mm SL (range = 27 to 134 mm SL). Most captured butterfish had not yet reached maturity based on length-to-maturity ratios given in Cross et al. (1999). Site 1 had the highest number captured (n = 37) of any site, and Site 3 had the least number captured (n = 10) (ANAMAR 2011). Densities per 1,000 m^2 ranged from 0.32 at Site 3 to 0.66 at Site 1 (ANAMAR 2011). No butterfish were collected during October 1985 trawl sampling in and around the Fernandina Beach ODMDS (Continental Shelf Associates 1986) or during March and December 1979 trawl sampling in and around the Jacksonville ODMDS (USEPA 1983).

Effects Determination

It appears that this species is largely absent from nearshore coastal waters in cooler months based on its known migratory habits and results of spring and fall 2010 trawl sampling. The project area is well beyond its range of primary abundance as described in Bigelow and Schroeder (1953) and Cross et al. (1999). It is possible that that the local population may be temporarily impacted from increased turbidity during disposal events. For these reasons, impacts to the butterfish are expected to be minimal.

2.5.12 Bluefish

In a scoping letter response to USEPA and USACE, NMFS expressed concern that the bluefish (*Pomatomus saltatrix*) may be affected by the proposed action (Appendix A of the EIS). The species occurs throughout Florida waters and in many other areas of the western Atlantic, although it is absent from the Bahamas, West Indies, and most of the Caribbean (Collette 2002a). Adults are highly migratory, are found in salinities above 21 ppt (MAFMC 2006), and favor shallow water adjacent to drop-offs from shoals and banks (Shipp 1986). Bluefish are commonly caught by anglers fishing the surf zone along Florida's east coast beaches (J.C. Seitz [ANAMAR], *pers. obs.*).

Adult, juvenile, and egg EFH in Florida include all pelagic waters along the east coast of Florida through Key West as well as estuaries north of and including the St. Johns River (MAFMC 2006). Larval EFH is similar to that of older life stages except that it is limited to water 15 m deep or greater (MAFMC 2006). No bluefish EFH or HAPC were identified on the EFH Mapper (NOAA Fisheries 2011). However, based on the written description of bluefish EFH in MAFMC (2006), the project area and surrounding waters are within adult, juvenile, and egg EFH. Additionally, most of the project area is within larval bluefish EFH (MAFMC 2006).

No bluefish were collected during spring and fall 2010 trawl sampling (ANAMAR 2011), during October 1985 trawl sampling in and around the Fernandina Beach ODMDS (Continental Shelf

Associates 1986), or during March and December 1979 trawl sampling in and around the Jacksonville ODMDS (USEPA 1983). However, the species is known to be common along Florida's east coast and is likely to inhabit the project area at least occasionally.

Effects Determination

Bluefish may be temporarily impacted by increased turbidity during disposal activities. For this reason, only minimal impacts are expected.

2.5.13 Summer Flounder, Scup, and Black Sea Bass

See Section 2.4.6 (Snapper-Grouper Complex Fishery) for a brief discussion on scup and black sea bass EFH and on black sea bass collected during trawl sampling.

Summer Flounder (*Paralichthys dentatus*)

In a scoping letter response to USEPA and USACE, NMFS expressed concern that local populations of the summer flounder may be adversely affected by the proposed action (Appendix A of the EIS). The species occurs from nearshore to a depth of 185 m, but typically occurs in depths of 40 m or less (Munroe 2002). Along the U.S. coast, the species ranges from Maine to at least northeastern Florida (Robins and Ray 1986). Some authors consider the southern limit of the range to be the southern tip of Florida (Munroe 2002) or even the northeastern Gulf of Mexico (Dahlberg 1976). The center of primary abundance is between Cape Cod, Massachusetts, and Cape Hatteras, North Carolina (Packer et al. 1999). Soft substrates such as sand or silt are often used (Packer et al. 1999). Spawning takes place in continental shelf waters from September through January and peaks in October and November (Packer et al. 1999). Larvae up to 13 mm SL are pelagic (Packer et al. 1999). Post-larval and juvenile summer flounder utilize salt marshes and tidal flats in high-salinity estuaries as nursery areas (Packer et al. 1999). EFH is not currently identified (NOAA 2009, NOAA Fisheries 2011).

No summer flounder were collected during spring and fall 2011 trawl sampling, although eight other paralichthyids were represented in the samples including the closely related Gulf and southern flounders (*Paralichthys albigutta* and *P. lethstigma*) (ANAMAR 2011). No summer flounder were collected during October 1985 trawl sampling in and around the Fernandina Beach ODMDS (Continental Shelf Associates 1986) or during March and December 1979 trawl sampling in and around the Jacksonville ODMDS (USEPA 1983). Although Packer et al. (1999) did not appear to clearly define EFH over non-essential habitat, the location of the project area is well outside of the center of primary abundance, and thus is outside summer flounder EFH.

Effects Determination

The project area appears to be far removed from the center of primary abundance as written in Packer et al. (2009). Any summer flounder that occur within the project area would likely continue to find acceptable soft substrate after fine-grained sediment is disposed at the site. Larger juveniles and adults should be able to move out from under newly placed sediment during disposal events. For these reasons, the effects on summer flounder are expected to be minimal.

3 POTENTIAL IMPACTS TO EFH

In general, the designation and use of one of the alternative sites as an ODMDS could potentially produce the following adverse environmental effects:

- Temporary water column perturbations (turbidity plumes, release of chemical contaminants, lowering dissolved oxygen concentrations)
- Mortality of benthic organisms
- Changing the bathymetry of the site
- Altering the sediment composition of the site

The following sections discuss the potential effects of dredged material disposal at the alternative sites. Turbidity and sedimentation are thought to be primary causes of impacts to EFH. Given that the three alternative sites occupy similar water depths, occur within the same geographic area, and are similarly affected by currents, waves, and tides, the effects of disposal are expected to be similar regardless of the site selected.

Dredged material is anticipated to originate primarily from the Jacksonville Harbor Navigation Project and the Naval Station Mayport entrance channel and turning basin. The composition of dredged material is expected to be similar to material that has been historically disposed at the Jacksonville ODMDS, which contains a mixture of silt, clay, and sand as well as coarse material such as shell, gravel, and rock (USEPA and USACE 2007). A tabulated summary of historic dredged material volumes deposited at the Jacksonville ODMDS can be found in Section 1.3.1 of the EIS.

3.1 Turbidity and Water Quality

The behavior of dredged material during disposal can be separated into three main phases, as follows:

Convective descent (the primary phase) occurs when the disposal cloud falls under the influence of gravity and its initial momentum is imparted by gravity.

Dynamic collapse (the secondary phase) occurs when the descending cloud either impacts the bottom or arrives at a level of neutral buoyancy, at which time descent is retarded and horizontal spreading dominates.

Passive transport-dispersion (the tertiary phase) commences when material transport and spreading are determined mostly by ambient currents and turbulence rather than by the dynamics of the disposal operation.

Analysis and evaluation have been performed on material originating from Jacksonville dredging projects. Assessments have been conducted to evaluate the impact of disposal of dredged material from these sites, and no long-term impacts to water quality have been documented. Disposal operations should have insignificant effects on concentrations of contaminants in the water column given that only dredged material of suitable quality will be permitted for disposal.

The chemical and physical composition of the water column within ODMDSs have shown little or no impact due to dredged material disposal based on past studies. Similarly, results of studies conducted by USEPA Region 4 at the Jacksonville ODMDS have shown little or no changes to the physical and chemical composition of the water column as compared to samples taken from outside the site (control samples).

3.1.1 Mitigation

Although short-term water quality (primarily turbidity) impacts during disposal operations are unavoidable, tiered testing of dredged material helps minimize the potential for significant impacts to water quality. In accordance with the requirements and procedures defined in the EPA's Ocean Dumping Regulations (40 CFR Parts 220, 225, 227, and 228), the suitability of dredged material proposed for disposal at the ODMDS must be demonstrated through appropriate physical, chemical, and biological testing. Ocean dumping regulation Section 227.6 prohibits the disposal of certain contaminants other than trace chemical constituents of dredged material. Further, regulatory decisions rely on assessments of the potential for unacceptable adverse impacts based on persistence, toxicity, and bioaccumulation of the constituents instead of specific numerical limits (USEPA and USACE 1991).

Determining the suitability of dredged material involves a multi-tiered testing procedure. Lower tiers use existing or easily obtained information and limited chemical testing to predict effects. If it is predicted that the dredged material has any potential for significant adverse effects, higher tiers are activated. Water column and benthic bioassay and bioaccumulation tests are utilized in higher tiers to determine effects on representative marine organisms.

In Tier II testing, water column impacts are assessed in terms of the limiting permissible concentration (LPC), which is the portion of dredged material that remains in the water column and is the amount of a given analyte or parameter which will not exceed marine water-quality criteria (Green Book). Dissolved chemical contaminants are analyzed and the results are compared to the water quality criteria after consideration of the initial mixing period (USEPA and USACE 1991). This process allows an indirect evaluation of any potential biological effect in the water column (USEPA and USACE 1991).

Water column bioassay studies consider the effects (after allowing for initial mixing) of both suspended particulates and dissolved contaminants on appropriately sensitive phytoplankton or zooplankton, crustaceans or mollusks, and fishes (USEPA and USACE 2008). At least one species from each of the three above-mentioned groups is required, resulting in a minimum of three series of tests for each dredged material sample, along with the control sample, and the dilution water sample (USEPA and USACE 2008). Examples of species used in bioassay tests for water column toxicity of dredged material include the eastern oyster (*Crassostrea virginica*) for zooplankton, blue mussel (*Mytilus edulis*) for mollusks, opossum shrimp (*Americamysis bigelowi*) for crustaceans, and Atlantic silverside (*Menidia menidia*) for fish (USEPA and USACE 2008).

Considerable effort is placed on establishing the effects of dredged material on the benthic environment in Tier III testing. A conservative approach is used to evaluate the potential physical impacts of the dredged material using whole-sediment bioassays. Analysis of chemical contaminants is used to assess potential effects of dredged material chemistry on the environment, including bioaccumulated impacts. Sediment chemistry analysis is used to identify contaminants of concern (if any), but cannot be used to predict biological effects (40 CFR Part 227, USEPA and USACE 1991) because effects are dependent on their bioavailability. To determine the bioavailability of chemical contaminants, appropriately sensitive deposit-feeding bivalves such as the bent-nose macoma [*Macoma nasuta*] and the file yoldia [*Yoldia limatula*]) and burrowing polychaete worms such as *Neanthes virens* and members of the genus *Arenicola* are used as test subjects in laboratory-controlled bioaccumulation bioassays (USEPA and USACE 1991). Bioaccumulation testing is undertaken for a 28-day period (USEPA and USACE 2008). For benthic effects toxicity analysis, test subjects are chosen to best represent filter-feeding, deposit-feeding, and burrowing behavioral adaptations (40 CFR Part 227, USEPA and USACE 2008). Species chosen to represent these adaptations include the gammarid amphipod *Ampelisca abdita*, the opossum shrimp *Americamysis bahia*, and the polychaete worm *Neanthes arenaceodentata* in laboratory-controlled toxicity tests (SERIM). Toxicity tests are run for 10 days (USEPA and USACE 2008).

3.1.2 Potential Impacts to Zooplankton

Impacts to zooplankton, including planktonic larvae of federally managed invertebrates and fishes, as a result of dredged material disposal may include mortality due to entrainment in the sediment plume and interference with filter-feeding caused by a temporary increase in suspended sediments. Pelagic eggs of fish can be smothered by re-suspended sediment (Suedel 2011). These impacts are expected to be short-term and localized and are not expected to significantly affect planktonic conditions in the region, especially considering that steps are taken in Tier II of the above-mentioned testing procedure to evaluate and prevent deleterious effects on zooplankton and other organisms of the water column before the dredged material is deemed suitable for ocean disposal.

3.1.3 Potential Impacts to Pelagic Fishes

Though information is limited, most studies on the effects of dredging and dredged material disposal on fish communities have focused on larvae and eggs in estuarine environments (e.g., Auld and Schubel 1978, Johnston and Wildish 1981). Results from these studies suggest that as long as the disposal of dredged material does not significantly affect these sensitive life stages, fishes and commercial fisheries will be similarly unaffected by disposal events (USEPA 1993).

Pelagic fishes and other actively swimming organisms are generally not adversely affected by dredged material disposal due to their high mobility (USEPA 1983). During a disposal event, the greatest impacts to pelagic fishes may be from increased turbidity within the disposal plume, which may temporarily limit the feeding efficiency of visually oriented predators and reduce the oxygen exchange capacity of their gills via the clogging of opercular cavities and gill filaments (Doudoroff 1957, USEPA 1993) and the physical abrasion of filtering and respiratory organs (Suedel 2011). Younger juveniles may be more susceptible to the effects of released dredged material (USEPA 1995). The reduction in oxygen exchange capacity in the gills of young juveniles and the effects of decreased dissolved oxygen associated with a turbidity plume can be more pronounced compared to effects on adults and older juveniles. However, highly mobile fishes are likely to avoid the disposal plume. However, it is possible that dredged material deposition at an ODMDS provides attractive foraging opportunities for actively predacious species by temporary displacement of epibenthic forage species. There are no artificial reefs within the immediate vicinity of the three alternative sites, and therefore no impacts are expected to such habitat.

Turbidity tests done using montmorillonite clay (a 2:1 smectite clay) particles and 16 warm-water fish species by Wallen (1951) showed no behavioral changes in fish until the turbidity levels were very high (nearing 20,000 ppm of silicone dioxide). Further, the Wallan (1951) study showed that most fish withstood concentrations above 50,000 ppm before mortality took place, and many of the fish were able to endure concentrations of more than 100,000 ppm for a week or longer before succumbing when turbidity reached between 175,000 and 225,000 ppm. In highly turbid conditions, harmful dissolved substances (whether natural or man-made) can impair the gas exchange capacity of the gills as much or more than can the particulate matter (Doudoroff 1957). The impairment of gill function in advanced life stages of fish ascribable to chemically inert suspended particles can apparently only occur when turbidity is exceedingly high (Doudoroff 1957), and so it is thought to only minimally effect fish gill functions during disposal activities. Based on previous evaluations of dredged material disposal at the existing Jacksonville ODMDS, dilution rates can range from 140 to 2760 after 4 hours (USACE 2010a).

Disposal activities at the site are expected to minimally affect pelagic fishes. Only a localized area will be affected by disposal operations, and fish populations are not geographically limited to the disposal site; therefore, the presence of such species within the affected area during disposal operations is expected to be minimal. Pelagic fishes traveling through the immediate area may modify their route during discharge operations. Adult fishes within and immediately adjacent to the disposal area may experience a temporary reduction in the oxygen exchange capacity of their gills due to clogging and physical abrasion (Suedel 2011). A minor decrease in dissolved oxygen due to an increase in the biological oxygen demand associated with the dredged material may also take place. Adult fishes may also experience stress from avoidance reactions (USEPA 1995). Reproductive behavior of fishes has also been suggested to be impacted during disposal activities (Suedel 2011). However, conditions that could impact pelagic fishes are expected to be short-term (measurable in hours) and localized (<1 nmi), and the effects on adults and larger juveniles living within the water column are not expected to be significant.

3.2 Sedimentation

Disposal of dredged material at any of the alternative sites is expected to result in accumulation of dredged material over the seafloor, changes in bathymetry, and changes in sediment characteristics within the site. Over the life of the site (50+ years), accumulations of material and changes in bathymetry could be substantial. Assuming dredged material is distributed evenly across the site and there is no transport of material outside the site, the depth of the site could be reduced to 9.2 m over the life of the site, which is the operational minimum depth established in the Site Management and Monitoring Plan (SMMP). Frequent movement of the dredged material discharge point (the release area) should minimize mounding and changes to site bathymetry. In addition, a monitoring program could detect a potential concern and aid in the prevention of any adverse effects.

As explained in Section 3.1.1, dredged material proposed for ocean disposal undergoes stringent bioassay and chemical testing designed minimize water column impacts, benthic toxicity effects, and bioaccumulation of contaminants. Disposal of dredged material that is determined to be suitable for ocean disposal is not expected to produce significant long-term environmental effects related to sediment chemistry and contaminants of concern. However, sediment grain size composition within the site may be significantly altered as a result of disposal of clay and silt on otherwise primarily sandy sediments. Progressive transition to sediments containing a higher percentage of silt and clay is inevitable with continued use of the site. Changes in sediment grain size composition may alter the benthic community structure. However, based on previous benthic studies, permanent or long-term adverse impacts to benthic infauna are not expected.

3.2.1 Mitigation

Impacts related to changes in bathymetry and sediment composition as a result of dredged material disposal are unavoidable. To minimize the significance and monitor impacts of disposal activities on the site, several measures have been included in the SMMP:

- Periodic monitoring of the site and surrounding area to determine changes in bathymetry, sediment composition, short-term and long-term fate of materials, and benthic community structure.
- Disposal of material confined to only the disposal zone. Project-specific release zones may be further defined within the disposal zone to better distribute dredged material throughout the ODMDS.
- An electronic tracking system (ETS) utilized to provide surveillance of the transportation and disposal of dredged material.

To reduce the effects of suspended sediments on epifauna, very fine-grained sediments (such as those from the Naval Station Mayport turning basin and entrance channel) should be deposited in the smallest area possible so that the least amount of benthic habitat is affected (Hirsch et al. 1978). However, sandy sediment similar to the native sediment should be dispersed over a larger area. The similar-grained sediment should minimally modify the disposal area, and a thin layer of sediment would allow epifaunal invertebrates and demersal fishes the best chance of surviving burial (Hirsch et al. 1978). The SMMP details how material will be managed within the ODMDS to minimize impacts (Appendix F of the EIS).

3.2.2 Potential Impacts to Demersal Fishes and other Epifauna

Disposal of dredged material at a selected site may affect demersal fishes and other epifaunal populations. The immediate local effect of dredged material disposal would be the burial of taxa such as penaeid and sycionid shrimp, searobins (*Prionotus* spp.), sand flounders (Paralichthyidae), and the blackcheek tonguefish (*Symphurus plagiusa*) as well as their epifaunal and infaunal prey. After dredged material is dumped, much of the fine-grained sediment remains suspended near the ocean floor (Hirsch et al. 1978). This can cause stress in fishes in part due to the reduction of oxygen exchange capacity in the gills due to clogging and physical abrasion (USEPA 1995, Suedel 2011). Larger juveniles and adults are able to avoid the suspended material by moving out of the area, but smaller juveniles are be more vulnerable and susceptible to stress (Science Applications International Corp. 1986).

Over the long term, dredged material disposal at a given site may result in a localized decrease in demersal fish species diversity and abundance. These reductions could be caused, in part, by reduced food availability (USEPA 1995). Benthic infaunal and epifaunal populations, which are the main food sources for demersal fishes, decline when disposal occurs frequently because the benthic fauna are unable to re-establish themselves (Science Applications International Corp. 1986). Some recovery of the benthic community occurs within months, but complete recovery of the original benthic communities requires about one to three years according to studies by Germano and Rhoads (1984), Dillon (1984), and Scott et al. (1987). When dumping occurs more often than yearly, the benthic community will likely experience reduced diversity and will support a more limited demersal fish community (USEPA 1995).

4 CONCLUSIONS

Alternative sites underwent a rigorous initial evaluation of hardbottom resources to avoid and minimize the impact of dredged material disposal to the largest extent possible. Sidescan sonar surveys were performed to identify natural and anthropogenic features of the three alternative sites and adjacent areas. Dive reconnaissance effort, sled camera work, and faunal survey data added to our understanding of these areas. Additionally, a rigorous tiered testing system is undertaken to assess the impacts of the liquid, suspended-particulate, and solid phases of dredged material proposed for ocean disposal before the material can be determined suitable for ocean disposal (40 CFR Part 227, SERIM).

EFH exists throughout the study area for several species and species groups. Effects to the water column, such as increased turbidity, are expected to be temporary. Direct effects of sedimentation are not expected to be substantial due to the mobility of the majority of federally managed species that may occur within the project area and the lack of geographic constraints within the vicinity of the project area. Benthic infaunal organisms and sessile organisms that serve as prey or that provide microhabitats to managed species are expected to be affected by disposal activities. Species and species groups preferring soft sediment (e.g., penaeid shrimp) may find the disposal of fine sediment attractive and may even benefit from disposal activities. The designation of a new ODMDS may provide some refuge for epibenthic invertebrates (e.g., penaeid shrimp, brown rock shrimp) and demersal fishes (e.g., black sea bass, rock sea bass, juvenile red snapper) from shrimp trawler activities as disposal sites are avoided by trawlers for fear of net damage. Overall, there is expected to be minimal overall effect on EFH and federally managed species in the area.

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5 REFERENCES

Adams, D.H., R.H. McMichael, and G.E. Henderson. 2003. *Mercury Levels in Marine and Estuarine Fishes of Florida, 1989–2001*. FMRI Technical Report TR-9, FWC, FMRI, St. Petersburg, FL.

Adams, D.H., M.E. Mitchell, and G.R. Parsons. 1994. Seasonal occurrence of the white shark, Carcharodon carcharias, in waters off the Florida west Coast, with notes on its life history. *Marine Fisheries Review* 56(4):24–28.

ANAMAR Environmental Consulting, Inc. 2010. *Final Report. Jacksonville ODMDS Reconnaissance Sidescan Sonar Survey, October 6-11, 2009 [plus addendum]*. Submitted to USACE, Jacksonville District, Jacksonville, FL.

ANAMAR Environmental Consulting, Inc. 2011. *Final Report. Site Designation Studies for a New Ocean Dredged Material Disposal Site off Jacksonville, Florida: Spring and Fall 2010 Survey Results*. Submitted to USACE, Jacksonville District, Jacksonville, FL.

Anderson, W.D. 2002. Lutjanidae. Snappers. Pp. 1479–1504. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 3: Bony Fishes Part 2 (Opistognathidae to Molidae), Sea Turtles And Marine Mammals.* FAO, Rome, Italy.

Auld, A.H. and J.R. Schubel. 1978. Effects of suspended sediment on fish eggs and larvae: a laboratory assessment. *Estuarine and Coastal Marine Science* 6:153–164.

Bass, A.J., J.D. D'Aubrey, and N. Kistnasamy. 1973. *Sharks of the East Coast of Southern Africa, I, The Genus* Carcharhinus *(Carcharhinidae)*. Investigative Report No. 33, The Oceanographic Research Institute, Republic of South Africa.

Bester, C. 2011. *Biological Profile for the Bonnethead* (Sphyrna tiburo) [website]. Part of the Florida Museum of Natural History, Ichthyology website accessed 03/14/11 at http://www.flmnh.ufl.edu/fish/gallery/descript/bonnethead/bonnethead.html

Bigelow, H.B. and W.C. Schroeder. 1948. *Fishes of the Western North Atlantic. Part One. Lancelets, Cyclostomes, and Sharks.* Memoirs of the Sears Foundation for Marine Research, No. 1, Yale University, New Haven, CT.

Bigelow, H.B. and W.C. Schroeder. 1953. *Fishes of the Gulf of Maine*. Fishery Bulletin 74, U.S. Department of the Interior, U.S. Fish and Wildlife Service, U.S. Government Printing Office, Washington, D.C.

Bullock, L.H. and G.B. Smith. 1991. *Memoirs of the Hourglass Cruises. Seabasses* (*Pisces: Serranidae*). Florida Marine Research Institute, Department of Natural Resources, St. Petersburg, FL.

Bumpus, D.F. 1973. A description of the circulation on the continental shelf of the east coast of the United States. *Progress in Oceanography* 6:111–157.

Burgess, W.E. 2002. Suborder Acanthuroidei. Ephippidae. Spadefishes. Pp. 1799–1800. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 3: Bony Fishes Part 2 (Opistognathidae to Molidae), Sea Turtles and Marine Mammals.* FAO, Rome, Italy.

Carlson, J.K. 2002. Sharks nurseries in the northeastern Gulf of Mexico. In: McCandless, C.T., H.L. Pratt, and N.E. Kohler (eds.), *Shark Nursery Grounds of the Gulf of Mexico and the East Coast Waters of the United States: An Overview*. [NMFS Internal Report] Submitted to NOAA Highly Migratory Species Office, NOAA Fisheries Narragansett Laboratory, Narragansett, RI.

Carson, R.L. 1944. *Fish and Shellfish of the South Atlantic and Gulf Coasts*. U.S. Department of the Interior, Office of the Coordinator of Fisheries, U.S. Printing Office, Washington, D.C.

Casey, J.G. and H.L. Pratt. 1985. Distribution of the white shark (*Carcharodon carcharias*) in the western north Atlantic. *Memoirs of the Southern California Academy of Sciences* 9:2–14.

Castro, J.I. 1983. *The Sharks of North American Waters*. Texas A & M University Press, College Station, TX.

Castro, J.I. 1993. The shark nursery of Bulls Bay, South Carolina, with a review of the shark nurseries of the southeastern coast of the United States. *Environmental Biology of Fishes* 38:37–48.

Castro, J.I. 2000. The biology of the nurse shark, *Ginglymostoma cirratum*, off the Florida east coast and the Bahama Islands. *Environmental Biology of Fishes* 58:1-22.

Castro, J.I., C.M. Woodley, and R.L. Brudek. 1999. *A Preliminary Evaluation of the Status of Shark Species*. NOAA, NMFS, Southeast Fisheries Science Center, Miami, FL.

Collette, B.B. 2002a. Pomatomidae. Bluefish. Pp. 1412–1413. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 3: Bony Fishes Part 2 (Opistognathidae to Molidae), Sea Turtles and Marine Mammals.* FAO, Rome, Italy.

Collette, B.B. 2002b. Rachycentridae. Cobia. Pp. 1420–1421. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 3: Bony Fishes Part 2 (Opistognathidae to Molidae), Sea Turtles and Marine Mammals.* FAO, Rome, Italy.

Collette, B.B. 2002c. Scombridae. Mackerels and tunas. Pp. 1836–1857. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 3: Bony Fishes Part 2 (Opistognathidae to Molidae), Sea Turtles and Marine Mammals.* FAO, Rome, Italy.

Compagno, L.J.V. 2002. Sharks. Pp. 357–505. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 1: Introduction, Molluscs, Crustaceans, Hagfishes, Sharks, Batoid Fishes and Chimaeras.* FAO, Rome, Italy.

Compagno, L.J.V., M. Dando, and S. Fowler. 2005. *Sharks of the World*. Princeton University Press, Princeton, NJ.

Continental Shelf Associates, Inc. 1986. *Final Report for Field Survey of Fernandina Candidate Ocean Dredged Material Disposal Site*. Report submitted to USACE, Jacksonville District, Jacksonville, FL.

Cross, J.N., C.A. Zetlin, P.L. Berrien, D.L. Johnson, and C. McBride. 1999. *Essential Fish Habitat Source Document: Butterfish,* Peprilus triacanthus*, Life History and Habitat Characteristics*. NOAA Technical Memorandum NMFS-NE_145, U.S. Department of Commerce, NMFS Northeast Fisheries Science Center, Woods Hole, MA.

Curtis, T.H. 2008. *Distribution, Movements, and Habitat Use of Bull Sharks (*Carcharhinus leucas*, Muller and Henle 1839) in the Indian River Lagoon System, Florida*. MS Thesis, University of Florida, Gainesville, FL.

Dahlberg, M.D. 1976. *Guide to the Coastal Fishes of Georgia and Nearby States.* University of Georgia Press, Athens, GA

Dale, D. 2010. National Marine Fisheries Service, Southeast Regional Office, Habitat Conservation Division, St. Petersburg, FL. *Pers. Comm*.

Dillon, T.M. 1984. *Biological Consequences of Bioaccumulation in Aquatic Animals: An Assessment of the Current Literature.* Technical Report D-84-2, USACE, Waterways Experiment Station, Vicksburg, MS.

Dodrill, J.W. 1977. *A Hook and Line Survey of the Sharks Found within Five Hundred Meters of Shore along Melbourne Beach, Brevard County, Florida*. MS Thesis, Florida Institute of Technology, Melbourne, FL.

Doudoroff, P. 1957. Water quality requirements of fishes and effects of toxic substances. Pp. 403–430. In: M.E. Brown (ed.) *The Physiology of Fishes. Volume II, Behavior*. Academic Press Inc., New York, NY.

Drohan, A.F., J.P. Manderson, and D.B. Packer. 2007. *Essential Fish Habitat Source Document: Black Sea Bass,* Centropristis striata*, Life History and Habitat Characteristics*. NOAA Technical Memorandum NMFS-NE-200, U.S. Department of Commerce, NMFS Northeast Fisheries Science Center, Woods Hole, MA.

Emery, K.O. and E. Uchupi. 1972. *Western North Atlantic Ocean: Topography, Rocks, Structure, Water, Life, and Sediments*. George Banta Co., Inc., Menasha, WI.

Fautin, D.G. and S.L. Romano. 2011. *Anthozoa: Sea Anemones, Corals, Sea Pens*. Accessed on 02/07/11 at http://tolweb.org/Anthozoa/17634.

Fenna, D. 2002. *A Dictionary of Weights, Measures and Units*. Oxford University Press, New York, NY.

Finucane, J.H. and L.A. Collins. 1984. Reproductive biology of cero, *Scomberomorus regalis*, from the coastal waters of south Florida. *Northeast Gulf Science* 7(1):101–107.

Finucane, J.H., L.A. Collins, H.A. Brusher, and C.H. Saloman. 1986. Reproductive biology of kind mackerel, *Scomberomorus cavalla*, from the southeastern United States. *Fishery Bulletin* 84(4):841–850.

Florida Fish and Wildlife Conservation Commission. 2008. *Rock Shrimp, Family Sicyoniidae. Brown Rock Shrimp,* Sicyonia brevirostris *Stimpson, 1871* [online publication]. Accessed 02/25/11 online at http://research.myfwc.com/features/category_sub.asp?id=2411

Freeman, B.L. and L.A. Walford. 1976. *Angler's Guide to the United States Atlantic Coast: Fish, Fishing Grounds & Fishing Facilities. Section VII, Altamaha Sound, Georgia to Fort Pierce, Florida*. U.S. Department of Commerce, NOAA, NMFS, Washington, D.C.

Geary, B.W., J.J. Mikulas, J.R. Rooker, A.M. Landry, and T.M. Dellapenna. 2007. Patterns of habitat use by newly settled red snapper in the northwestern Gulf of Mexico. Pp. 25–38. In: Patterson, W.F., J.H. Cowan, G.R. Fitzhugh, and D.L. Nieland (eds.) *Red Snapper Ecology and Fisheries in the U.S. Gulf of Mexico*. American Fisheries Society, Symposium 60, Bethesda, MD.

Geoghegan, P. and M.E. Chittenden. 1982. Reproduction, movements, and population dynamics of the longspine porgy, *Stenotomus caprinus*. *Fishery Bulletin* 80(3):523–540.

Geo-Marine, Inc. 2008. *Marine Resources Assessment Update for the Charleston/Jacksonville Operating Area.* Submitted to Department of the Navy, U.S. Fleet Forces Command, Norfolk, VA.

Germano, J.D. and D.C. Rhoads. 1984. REMOTS Sediment Profiling at the Field Verification Program (FVP) Disposal Site. Pp. 536–544. In: R.L. Montgomery and J.W. Leach (eds.) *Dredging and Dredged Material Disposal. Volume I*. American Society of Civil Engineers, New York, NY.

Gulf of Mexico Fishery Management Council and South Atlantic Fishery Management Council. 1982. *Fishery Management Plan Final Environmental Impact Statement for Coral and Coral Reefs*. GMFMC, Tampa, FL and SAFMC, Charleston, SC.

Harris, M. 2010. [Private consultant] New Port Richey, FL. *Pers. Comm*.

Hayse, J.W. 1990. Feeding habits, age, growth, and reproduction of Atlantic spadefish *Chaetodipterus faber* (Pisces: Ephippidae) in South Carolina. *Fishery Bulletin* 88(1):67–83.

Heemstra, P.C., W.D. Anderson, and P.S. Lobel. 2002. Serranidae. Groupers (seabasses, creolefish, coney, hinds, hamlets, anthiines, and soapfishes). Pp. 1308–1369. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 2, Bony Fishes Part 1: (Acipenseridae to Grammatidae)*. FAO, Rome, Italy.

Hendrickson, L.C. and E.M. Holmes. 2004. *Essential Fish Habitat Source Document: Northern Shortfin Squid,* Illex illecebrosus*, Life History and Habitat Characteristics*. U.S. Department of Commerce, NOAA, NMFS, Northeast Fisheries Science Center, Woods Hole, MA.

Hirsch, ND, LH Disalvo, and R. Peddicord. 1978. *Effects of Dredging and Disposal on Aquatic Organisms.* Technical Report DS-78-5, USACE, Waterways Experiment Station, Environmental Laboratory, Vicksburg, MS.

Hoese, H.D. and R.H. Moore. 1977. *Fishes of the Gulf of Mexico: Texas, Louisiana, and Adjacent Waters.* Texas A & M University Press, College Station, TX.

Hood, P.B., M.F. Godcharles, and R.S. Barco. 1994. Age, growth, reproduction, and the feeding ecology of black sea bass, *Centropristis striata* (Pisces: Serranidae), in the Gulf of Mexico. *Bulletin of Marine Science* 54(1):24–37.

Hood, P.B., A.J. Strelcheck, and P. Steele. 2007. A history of red snapper management in the Gulf of Mexico. Pp. 267–284. In: Patterson, W.F., J.H. Cowan, G.R. Fitzhugh, and D.L. Nieland (eds.) *Red Snapper Ecology and Fisheries in the U.S. Gulf of Mexico*. American Fisheries Society, Symposium 60, Bethesda, MD.

Hubbel, G. 2011. Jaws International, Gainesville, FL. *Pers. Comm*.

Huff, J.A. and S.P. Cobb. 1979. *Memoirs of the Hourglass Cruises. Penaeoid and Sergestoid Shrimps (Crustacea: Decapoda)*. Florida Marine Research Institute, Department of Natural Resources, St. Petersburg, FL.

Hyman, L. 1940. *The Invertebrates: Protozoa through Ctenophora*. McGraw-Hill Book Co., New York, NY.

Jacobson, L.D. 2005. *Essential Fish Habitat Source Document: Longfin Inshore Squid,* Loligo pealeii*, Life History and Habitat Characteristics*. U.S. Department of Commerce, NOAA, NMFS, Northeast Fisheries Science Center, Woods Hole, MA.

Johnston, D.W. and D.J. Wildish. 1981. Avoidance of dredge spoil by herring (Clupea: *harengus harengus*)*. Bulletin of Environmental Contaminants and Toxicology* 26:307–314.

Jones, N. 2010. Shrimp Producers Association, Jacksonville, FL. *Pers. Comm*.

Kantha, L.H., G.L. Mellor, and A.F. Blumberg. 1982. A diagnostic calculation of the general circulation in the South Atlantic Bight. *Journal of Physical Oceanography* 12:805–819.

Kells, V. and K. Carpenter. 2011. *A Field Guide to Coastal Fishes from Maine to Texas*. Johns Hopkins University Press, Baltimore, MD.

Kerstetter, D.W. and M.L. Taylor. 2008. Live release of a bigeye sand tiger *Odontaspis noronhai* (elasmobranchii: lamniformes) in the western north Atlantic Ocean. *Bulletin of Marine Science* 83(3):465–469.

Link, G.W. 1980. *Age, Growth, Reproduction, Feeding, and Ecological Observations on the Three Species of* Centropristis (*Pisces: Serranidae*) *in North Carolina Waters* [dissertation]. University of North Carolina, Chapel Hill, NC.

Maptech. 2007. *Chartkit. Florida East Coast and the Keys. Region 7. 14th Edition*. Maptech, Inc., Amesbury, MA.

Matsuura, K. 2002. Balistidae. Triggerfishes (durgons). Pp. 1963–1969. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 3, Bony Fishes Part 2: (Opistognathidae to Molidae), Sea Turtles and Marine Mammals*. FAO, Rome, Italy.

McCandless, C.T., H.L. Pratt, and N.E. Kohler (eds.). 2002. *Shark Nursery Grounds of the Gulf of Mexico and the East Coast Waters of the United States: An Overview*. [NMFS Internal Report] Submitted to NOAA Highly Migratory Species Office, NOAA Fisheries Narragansett Laboratory, Narragansett, RI.

McEachran J.D. and J.D. Fechhelm. 2005. *Fishes of the Gulf of Mexico. Vol. 2: Scorpaeniformes to Tetraodontoformes*. University of Texas Press, Austin, TX.

Mid-Atlantic Fishery Management Council. 2006. *2007 Bluefish Specifications, Draft Environmental Assessment, Regulatory Impact Review, and Initial Regulatory Flexibility Analysis*. MAFMC, Dover, DE.

Mid-Atlantic Fishery Management Council. 2010. *Mid-Atlantic Fishery Management Council Fishery Management Plans*. Accessed 08/17/10 at http://www.mafmc.org/fmp/fmp.htm.

Munroe, T.A. 2002. Paralichthyidae. Sand flounders. Pp. 1898–1921. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 3: Bony Fishes Part 2 (Opistagnathidae to Molidae), Sea Turtles and Marine Mammals*. FAO, Rome, Italy.

Nakamura, I. 1985. *FAO Species Catalog. Vol. 5: Billfishes of the World, An Annotated and Illustrated Catalog of Marlins, Sailfishes, Spearfishes, and Swordfishes Known to Date*. United Nations Development Programme, FAO, Rome.

Nakamura, I. 2002. Istiophoridae. Billfishes (spearfishes, marlins, and sailfishes). Pp. 1860–1866. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 3: Bony Fishes Part 2 (Opistagnathidae to Molidae), Sea Turtles and Marine Mammals*. FAO, Rome, Italy.

National Marine Fisheries Service. 2004. *Essential Fish Habitat Consultation Guidance. Version 1.1*. National Marine Fisheries Service, Office of Habitat Conservation, Silver Springs, MD.

National Marine Fisheries Service. 2008. *Essential Fish Habitat: A Marine Fish Habitat Conservation Mandate for Federal Agencies. South Atlantic Region*. NMFS, habitat Conservation Division, Southeast Regional Office, St. Petersburg, FL.

National Marine Fisheries Service. 2009. *Amendment 4 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan: Caribbean Fishery Management Measures*. NMFS Highly Migratory Species Management Division, Silver Spring, MD.

National Marine Fisheries Service. 2010. *Final Amendment 3 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan*. NMFS, Highly Migratory Species Management Division, Silver Spring, MD.

National Oceanic and Atmospheric Administration. 2009. *Final Amendment 1 to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan. Essential Fish Habitat, Including a Final Environmental Impact Statement*. Department of Commerce, NOAA, NMFS, Highly Migratory Species Management Division, Office of Sustainable Fisheries, Silver Spring, MD.

National Oceanic and Atmospheric Administration Fisheries. 2011. *NOAA Fisheries Essential Fish Habitat Mapper* [website]. Accessed 08/17/10 and 02/08/11 online at http://sharpfin.nmfs.noaa.gov/website/EFH_Mapper/map.aspx.

Naval Facilities Engineering Command, Southeast. 2008. *Final EIS for the Proposed Homeporting of Additional Surface Ships at Naval Station Mayport, FL. Vol. 1 Final Environmental Impact Statement*.

Nelson, J.S., E.J. Crossman, H. Espinosa-Pérez, L.T. Findley, C.R. Gilbert, R.N. Lean, and J.D. Williams. 2004. *Common and Scientific Names of Fishes from the United States, Canada, and Mexico.* American Fisheries Society Special Publication 29, Bethesda, MD.

New England Fishery Management Council. 1998. Essential Fish Habitat Description: Monkfish (*Lophius americanus*) [online PDF]. Accessed 02/11/11 online at http://www.nefmc.org/monk/index.html.

New England Fishery Management Council and Mid-Atlantic Fishery Management Council. 2011. *Monkfish Fishery Management Plan Amendment 5. Incorporating Stock Assessment and Fishery Evaluation (SAFE) Reports for the 2007 & 2008 Fishing Years and the Environmental Assessment* [online PDF]. Accessed 02/11/11 online at http://www.nefmc.org/monk/index.html.

Nichols, J.A., G.T. Rowe, C.H.H. Clifford, and R.A. Young. 1978. In situ experiments on the burial of marine invertebrates. *Journal of Sedimentary Petrology* 48(2):419–425.

Packer, D.B., S.J. Griesbach, P.L. Berrien, C.A. Zetlin, D.L. Johnson, W.W. Morse. 1999. *Essential Fish Habitat Source Document: Summer Flounder,* Paralichthys dentatus*, Life History and Habitat Characteristics*. NMFS, James J. Howard Marine Sciences Laboratory, Highlands, NJ.

Parker, R.O., D.R. Colby, and T.D. Willis. 1983. Estimated amount of reef habitat on a portion of the U.S. South Atlantic and Gulf of Mexico continental shelf. *Bulletin of Marine Science* 33(4):935–940.

Piercy, A. 2009. *Reproduction of the Sandbar Shark,* Carcharhinus plumbeus*, in the Western North Atlantic Ocean and Gulf of Mexico*. PhD dissertation, University of Florida, Gainesville, FL.

Pitchford, T.D. 2005. Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Marine Mammal Pathobiology Laboratory, St. Petersburg, FL. *Pers. Comm.*

Powell, D. 1975. *Age, Growth, and Reproduction in Florida Stocks of Spanish Mackerel,* Scomberomorus maculatus. Florida Marine Research Publications Number 5, Florida Department of Natural Resources, Florida Marine Research Laboratory, St. Petersburg, FL.

Robins, C.R. and G.C. Ray. 1986. *A Field Guide to Atlantic Coast Fishes of North America*. Houghton Mifflin Co., New York, NY.

Schuchert, P. 2011. *World Hydrozoa Database* [website]. Accessed online on 02/07/11 at http://www.marinespecies.org/hydrozoa.

Science Applications International Corporation. 1986. *Ocean Dumping Site Designation Delegation Handbook for Dredged Material.* Submitted to USEPA, Washington, D.C.

Scott, J., D.C. Rhoads, J. Rosen, S. Pratt, and J. Gentile. 1987. *Impact of Open-Water Disposal of Black Rock Harbor Dredged Material on Benthic Recolonization at the FVP Site.* Technical Report D-87-4, USACE and USEPA, Washington, D.C.

Seaman, W., and A.C. Jensen. 2000. Purposes and practices of artificial reef evaluation. Pp. 1–19. In: W. Seaman (ed.), *Artificial Reef Evaluation*. CRC Press, New York, NY.

Shipp, R.L. 1986. *Dr. Bob Shipp's Guide to Fishes of the Gulf of Mexico*. KME Seabooks, Mobile, AL.

Smith-Vaniz, W.F. 2002. Carangidae. Jacks and scads (bumpers, leatherjacks, amberjacks, pilotfishes, rudderfishes). Pp. 1426–1468. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 3: Bony Fishes Part 2 (Opistognathidae to Molidae), Sea Turtles and Marine Mammals*. FAO, Rome, Italy.

Snelson, F.F., T.J. Mulligan, and S.E. Williams. 1984. Food habits, occurrence, and population structure of the bull shark, *Carcharhinus leucas*, in Florida coastal lagoons. *Bulletin of Marine* Science 34:71–80.

South Atlantic Fishery Management Council. (no date). *Species Managed by the South Atlantic Fishery Management Council*. South Atlantic Fishery Management Council, Charleston, SC. Accessed 08/10/10 online at http://www.safmc.net/Portals/6/Regulations/SAFMC_Managed%20Species_rev2009.pdf

South Atlantic Fishery Management Council. 1998. *Final Habitat Plan for the South Atlantic Region: Essential Fish Habitat Requirements for Fishery Management Plans of the South Atlantic Fishery Management Council.* The Shrimp Fishery Management Plan, the Red Drum Fishery Management Plan, the Snapper Grouper Fishery Management Plan, the Coastal Migratory Pelagic Fishery Management Plan, the Golden Crab Fishery Management Plan, the Spiny Lobster Fishery Management Plan, the Coral, Coral Reefs, and Live/Hard Bottom Habitat Fishery Management Plan, the Sargassum Habitat Fishery Management Plan, and the Calico Scallop Fishery Management Plan. SAFMC, Charleston, SC.

South Atlantic Fishery Management Council. 2002. *Second Revised Final Fishery Management Plan for Pelagic* Sargassum *Habitat of the South Atlantic Region, Including a Final Environmental Impact Statement, Initial Regulatory Flexibility Analysis, Regulatory Impact Review, & Social Impact Assessment/Fishery Impact Statement*. SAFMC, Charleston, SC.

Springer, S. 1939. The great white shark, *Carcharodon carcharias* (Linnaeus) in Florida waters. *Copeia* 1939(2):114–115.

Springer, S. 1960. *Natural History of the Sandbar Shark,* Eulamia milberti. Fishery Bulletin 178, U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Springer, S. 1963. Field observations on large sharks of the Florida-Caribbean region. Pp. 95–113. In: P.W. Gilbert (ed.) *Sharks, Skates, and Rays*. John Hopkins Press, Baltimore, MD.

Steimle, F.W., C.A. Zetlin, P.L. Berrien, D.L. Johnson, and S. Chang. 1999. *Essential Fish Habitat Source Document: Scup, Stenotomus chrysops, Life History and Habitat Charactoristics*. NOAA Technical Memorandum NMFS-NE-149, U.S. Department of Commerce, NOAA, NMFS, Northeast Fisheries Science Center, Woods Hole, MA.

Suedel, B. 2011. *Problem Formulation: Endpoints and Conceptual Models for Assessing and Managing Risks from Resuspension* [oral presentation]. Dredged Material Assessment and Management Seminar, 05/24-26/11, Crowne Plaza, Jacksonville, FL.

Tavares, M. 2002a. Lobsters. Pp. 293–325. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 1: Introduction, Molluscs, Crustaceans, Hagfishes, Sharks, Batoid Fishes and Chimaeras*. FAO, Rome, Italy.

Tavares, M. 2002b. Shrimps. Pp. 251–291. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 1: Introduction, Molluscs, Crustaceans, Hagfishes, Sharks, Batoid Fishes and Chimaeras*. FAO, Rome, Italy.

Thomas, J. 2010. Shrimp Producers Association, Yulee, FL. *Pers. Comm.*

Turgeon, D.D., J.F. Quinn, A.E. Bogan, E.V. Coan, F.G. Hochberg, W.G. Lyons, P.M. Mikkelsen, R.J. Neves, C.F.E. Roper, G. Rosenberg, B. Roth, A. Scheltema, F.G. Thompson, M. Vecchione, and J.D. Williams. 1998. *Common and Scientific Names of Aquatic Invertebrates from the United States and Canada. Mollusks*. *Second Edition*. American Fisheries Society Special Publication 26, Bethesda, MD.

U.S. Army Corps of Engineers. 2008a. *Post Disposal Summary Report, Jacksonville ODMDS. Project: Jacksonville Harbor Maintenance Dredging*. USACE, Jacksonville District, Jacksonville, FL.

U.S. Army Corps of Engineers. 2008b. *Post Disposal Summary Report, Jacksonville ODMDS. Project: Maintenance Dredging of U.S. Naval Station, Mayport, Entrance Channel, Turning Basin, Destroyer Slip, Carrier Basin and Pier C-2*. USACE, Jacksonville District, Jacksonville, FL.

U.S. Army Corps of Engineers. 2010a. *MPRSA 103 Evaluation, U.S. Naval Station Mayport Construction Dredging Project: Turning Basin*. USACE, Jacksonville District, Jacksonville, FL.

U.S. Army Corps of Engineers. 2010b. *Post Disposal Summary Report, Jacksonville ODMDS. Project: Maintenance Dredging of the U.S. Naval Station, Mayport, Entrance Channel, Turning Basin, Destroyer Slip, Carrier Basin and Pier C-2*. USACE, Jacksonville District, Jacksonville, FL.

U.S. Environmental Protection Agency. 1983. *Final Environmental Impact Statement (EIS) for Jacksonville Harbor, Florida, Ocean Dredged Material Disposal Site Designation*. USEPA, Criteria and Standards Division, Washington, D.C.

U.S. Environmental Protection Agency. 1993. *Final Environmental Impact Statement for Designation of a Deep Water Ocean Dredged Material Disposal Site off San Francisco, California.* USEPA Region IX, San Francisco, CA.

U.S. Environmental Protection Agency. 1995. *Final Environmental Impact Statement for Designation of an Ocean Dredged Material Disposal Site off Humboldt Bay, California.* USEPA Region 9, Bellevue, WA.

U.S. Environmental Protection Agency. 2010a. *New Jacksonville ODMDS Designation Dive Report* [from 3/31/10 dive survey]. USEPA, Region 4, Atlanta, GA.

U.S. Environmental Protection Agency. 2010b. *New Jacksonville ODMDS Designation Dive Report* [from 9/18/10 dive survey]. USEPA, Region 4, Atlanta, GA.

U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. 1991. *Evaluation of Dredged Material Proposed for Ocean Disposal. Testing Manual* [Green Book]. EPA 503-8-91-001. USEPA Region 4 and USACE, South Atlantic Division, Atlanta, GA.

U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. 2008. *Southeast Regional Implementation Manual (SERIM) for Requirements and Procedures for Evaluation of the Ocean Disposal of Dredged Material in Southeastern U.S. Atlantic and Gulf Coast Waters*. EPA 904-B-08-001. USEPA, Region 4 and USACE, South Atlantic Division, Atlanta, GA.

Vecchione, M. 2002. Cephalopods. Pp. 149–244. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 1: Introduction, Molluscs, Crustaceans, Hagfishes, Sharks, Batoid Fishes and Chimaeras*. FAO, Rome, Italy.

Wallen, I.E. 1951. The direct effect of turbidity on fishes. *Bulletin of Oklahoma Agricultural and Mechanical College* 48(2):1–27.

Westneat, M.W. 2002. Labridae. Wrasses. Pp. 1701–1722. In: Carpenter, K.E. (ed.), *FAO Species Identification Guide for Fishery Purposes: The Living Marine Resources of the Western Central Atlantic. Vol. 3: Bony Fishes Part 2 (Opistognathidae to Molidae), Sea Turtles and Marine Mammals*. FAO, Rome, Italy.

Wilber, P. 2011. Atlantic Branch Chief, Southeast Regional Office of NOAA Fisheries, Charleston, NC. *Pers. Comm.*

Williams, A.B., L.G. Abele, D.L. Felder, H.H. Hobbs, R.B. Manning, P.A. McLaughlin, and I.P. Farfante. 1989. *Common and Scientific Names of Aquatic Invertebrates from the United States and Canada: Decapod Crustaceans.* American Fisheries Society Special Publication 17, Bethesda, MD.

Wilson, C.A. and D.L. Nieland. 2001. Age and growth of red snapper, *Lutjanus campechanus*, from the northern Gulf of Mexico off Louisiana. *Fishery Bulletin* 99(4):653–664.

Worthington, L.V. 1980. Sargasso Sea. In: S.P. Parker (ed.) *McGraw-Hill Encyclopedia of Ocean and Atmospheric Sciences*. McGraw-Hill Book Co., New York, NY.

Zani, M. 2005. New England Aquarium, Boston, MA. *Pers. Comm.*

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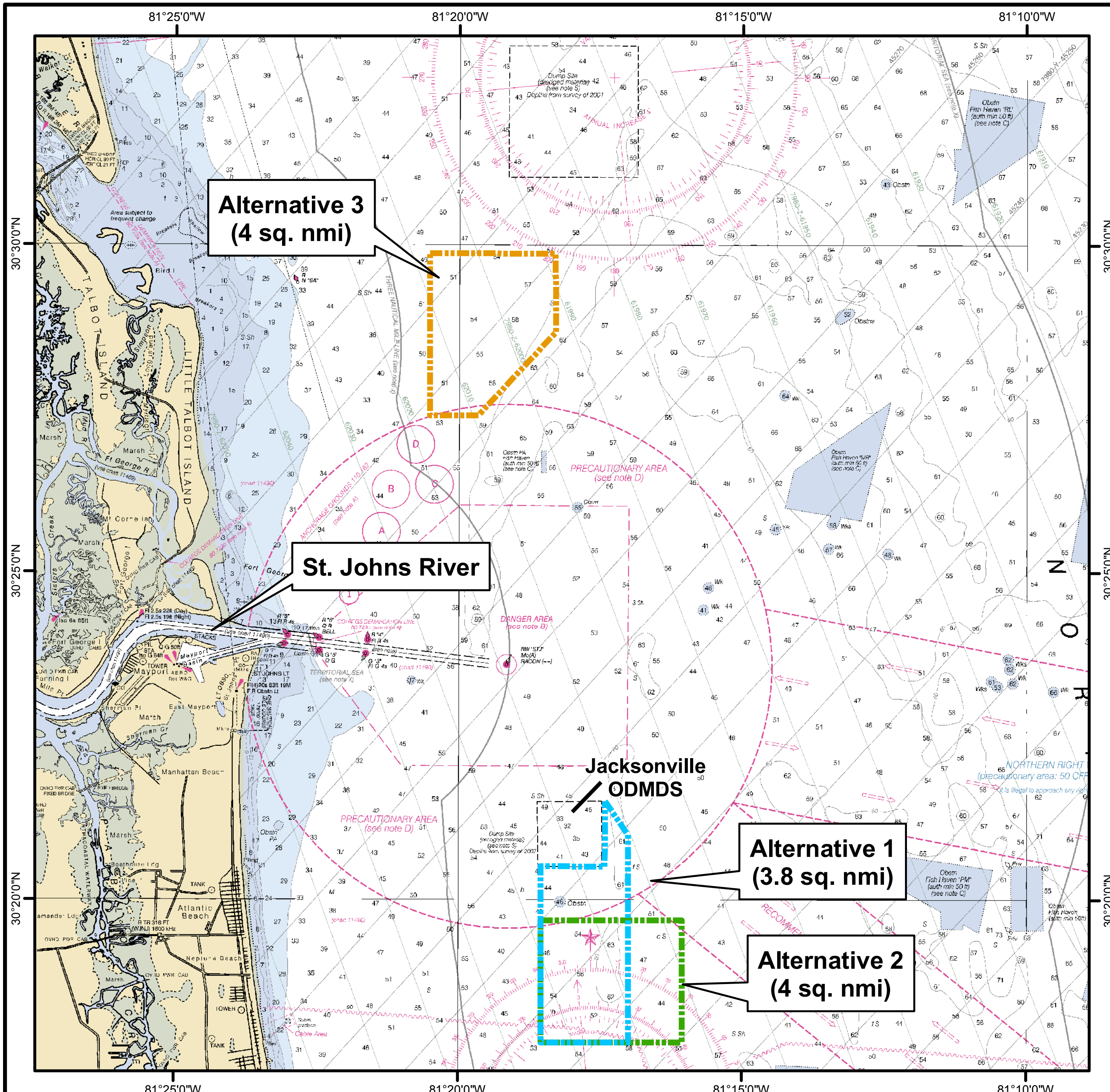
Figures

Figure 1
Site Boundaries
Alternatives 1-3

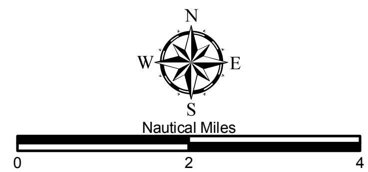


LEGEND

Alternative Site 1

Alternative Site 2

Alternative Site 3



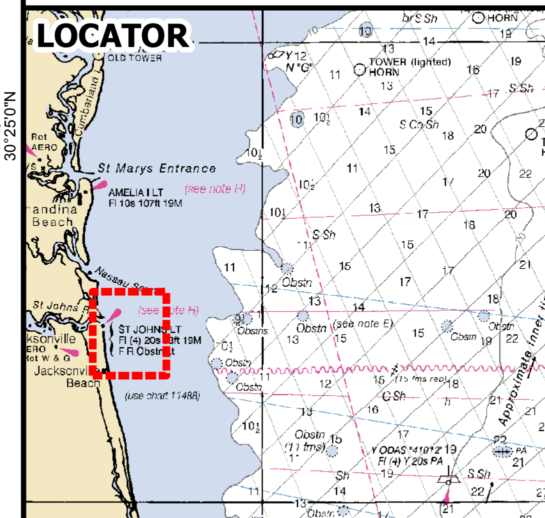


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Figure 2
Alternatives 1 and 2 and Hardbottom Areas

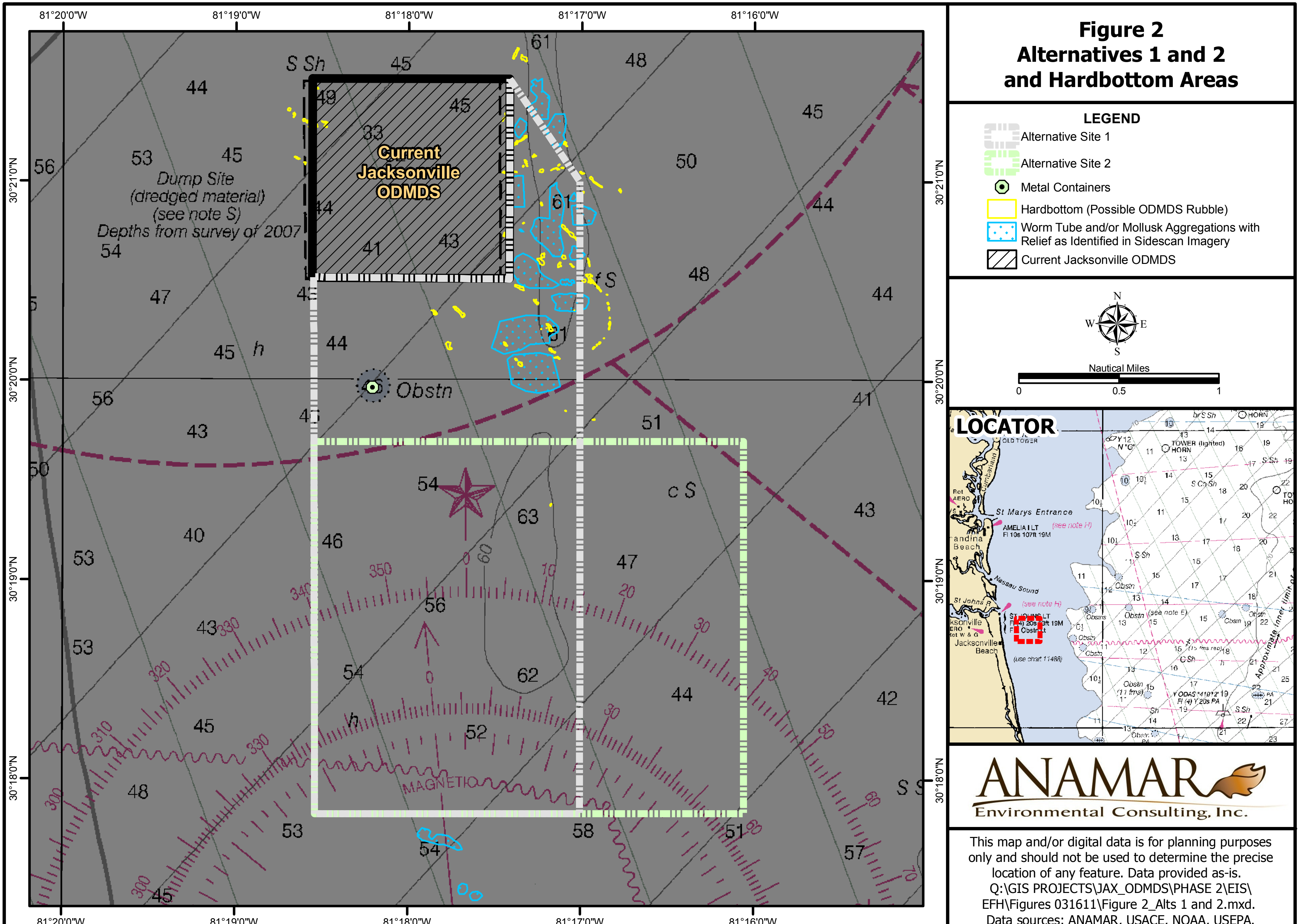

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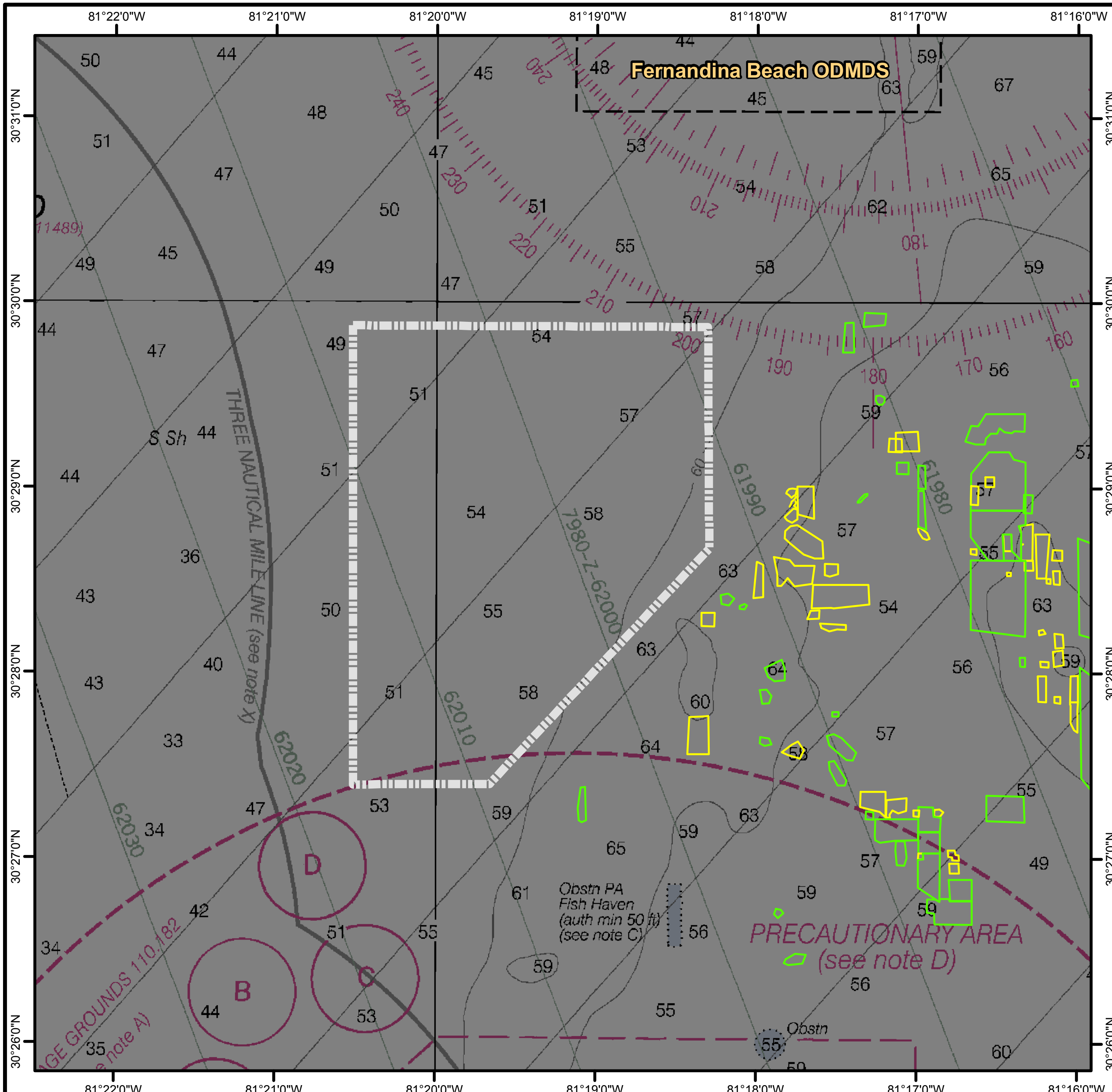
Figure 3
Alternative 3 and Hardbottom Areas



LEGEND

- Alternative Site 3
- Hardbottom
- Potential Hardbottom

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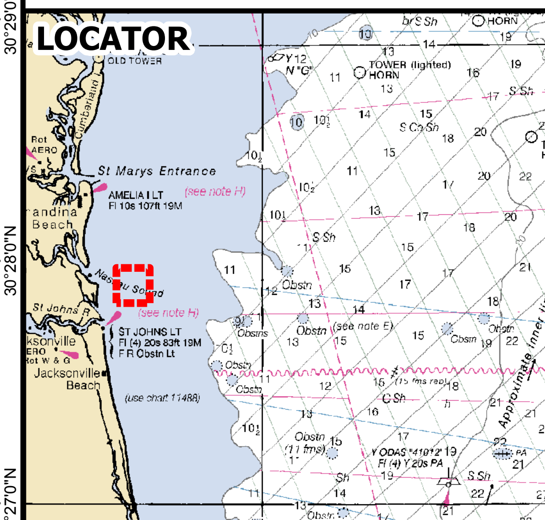

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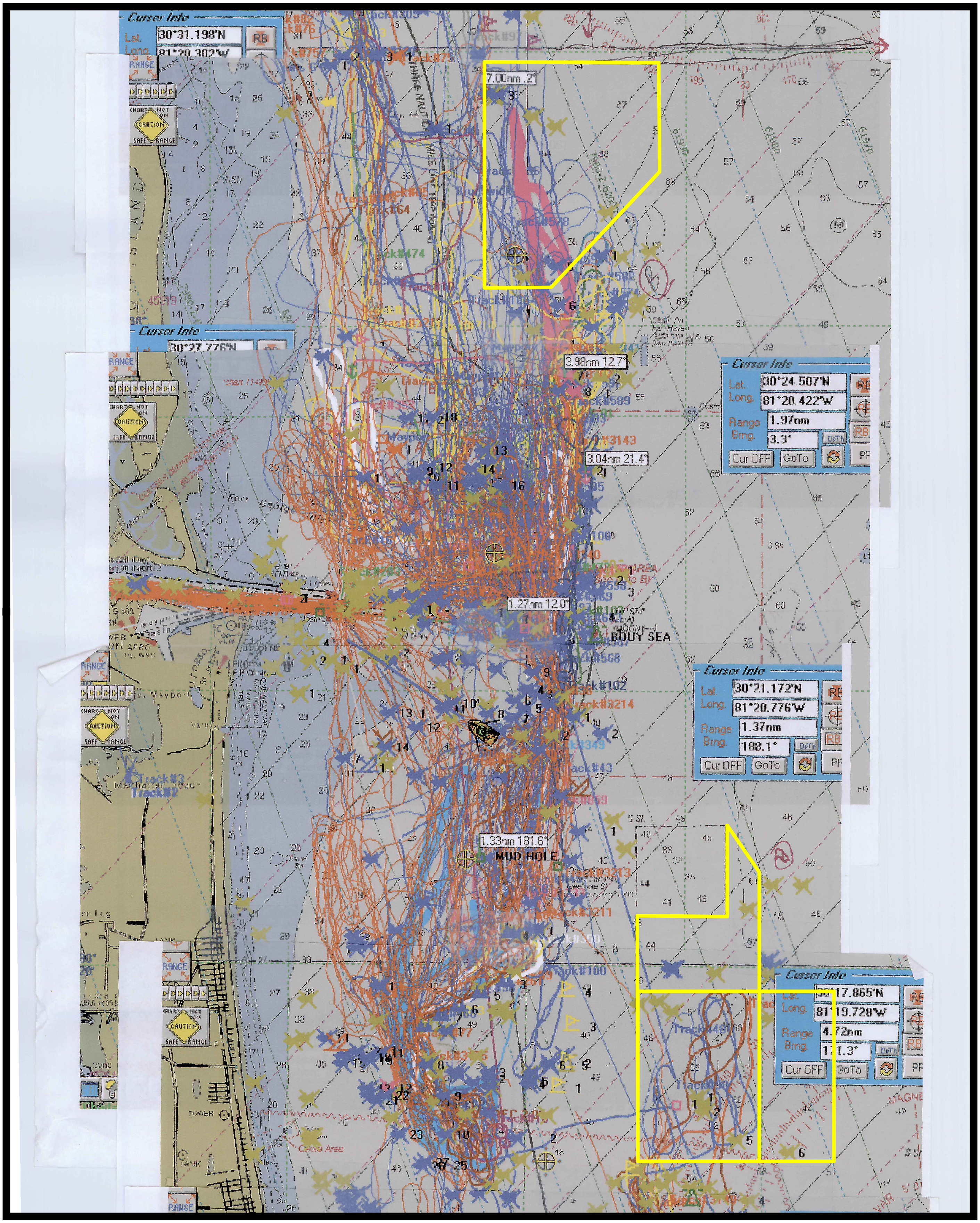

Figure 4. Areas Transected by Commercial Shrimp Trawlers and Alternative Sites 1, 2, and 3

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Data provided as-is. Data source: Nancy Jones 2010 Q:\GIS PROJECTS\JAX_ODMDS\PHASE 2\EIS\EFH\Figures 031611\Figure 4 Shrimp Trawling Lines_V02_102011.mxd

Tables

ANAMAR Environmental Consulting, Inc.

Table 1.

Species Managed by the South Atlantic Fishery Management Council

Management Group or Subgroup	Common Name[1] or Description	Scientific Name[1] or Taxonomic Group
SARGASSUM FISHERY MANAGEMENT PLAN (2 species)		
	Sargassum	*Sargassum fluitans*
	Sargassum	*Sargassum natans*
CORAL, CORAL REEFS, AND LIVE / HARDBOTTOM HABITAT FISHERY MANAGEMENT PLAN (many species)		
Corals (many species)		
	Hydrocorals	Hydrozoa
	Fire corals	Hydrozoa
	Precious corals	Anthozoa
	Sea fans	Anthozoa
	Sea pens	Anthozoa
	Sea whips	Anthozoa
	Stony corals	Anthozoa
Coral Reefs		
	Constitutes hardbottom, deepwater banks, patch reefs, and outer bank reefs.	
Live Rock		
	Any living organisms assembled or attached to a hard substrate, including dead coral or rock, but excluding individual mollusk shells.	
SHRIMP FISHERY MANAGEMENT PLAN (3 families, 6 species)		
	Brown rock shrimp	*Sicyonia brevirostris*
	Northern brown shrimp	*Farfantepenaeus aztecus*
	Northern pink shrimp	*Farfantepenaeus duorarum*
	Northern white shrimp	*Litopenaeus setiferus*
	Royal red shrimp[2]	*Pleoticus robustus*
	Seabob	*Xiphopenaeus kroyeri*
SPINY LOBSTER FISHERY MANAGEMENT PLAN (1 species)		
	Caribbean spiny lobster	*Panulirus argus*
GOLDEN CRAB FISHERY MANAGEMENT PLAN (1 species)		
	Golden crab[2]	*Chaceon fenneri*
SNAPPER GROUPER COMPLEX FISHERY MANAGEMENT PLAN (10 families, 73 species)		
Sea Basses and Groupers (21 species)		
	Bank sea bass	*Centropristis ocyurus*
	Black grouper	*Mycteroperca bonaci*
	Black sea bass	*Centropristis striata*
	Coney	*Cephalopholis fulva*
	Gag	*Mycteroperca microlepis*
	Goliath grouper	*Epinephelus itajara*
	Graysby	*Cephalopholis cruentata*
	Misty grouper	*Epinephelus mystacinus*
	Nassau grouper	*Epinephelus striatus*
	Red grouper	*Epinephelus morio*
	Red hind	*Epinephelus guttatus*
	Rock hind	*Epinephelus adscensionis*
	Rock sea bass	*Centropristis philadelphica*
	Scamp	*Mycteroperca phenax*
	Snowy grouper	*Epinephelus niveatus*
	Speckled hind	*Epinephelus drummondhayi*
	Tiger grouper	*Mycteroperca tigris*
	Warsaw grouper	*Epinephelus nigritus*

Table 1. (*continued*)
Species Managed by the South Atlantic Fishery Management Council

Management Group or Subgroup	Common Name[1] or Description	Scientific Name[1] or Taxonomic Group
	Yellowedge grouper	*Epinephelus flavolimbatus*
	Yellowfin grouper	*Mycteroperca venenosa*
	Yellowmouth grouper	*Mycteroperca interstitialis*
Wreckfishes (1 species)		
	Wreckfish[2]	*Polyprion americanus*
Snappers (14 species)		
	Black snapper[2]	*Apsilus dentatus*
	Blackfin snapper	*Lutjanus buccanella*
	Cubera snapper	*Lutjanus cyanopterus*
	Dog snapper	*Lutjanus jocu*
	Gray snapper	*Lutjanus griseus*
	Lane snapper	*Lutjanus synagris*
	Mahogany snapper	*Lutjanus mahogoni*
	Mutton snapper	*Lutjanus analis*
	Queen snapper[2]	*Etelis oculatus*
	Red snapper	*Lutjanus campechanus*
	Schoolmaster	*Lutjanus apodus*
	Silk snapper[2]	*Lutjanus vivanus*
	Vermilion snapper[2]	*Rhomboplites aurorubens*
	Yellowtail snapper	*Ocyurus chrysurus*
Porgies (9 species)		
	Grass porgy	*Calamus arctifrons*
	Knobbed porgy	*Calamus nodosus*
	Longspine porgy	*Stenotomus caprinus*
	Jolthead porgy	*Calamus bajonado*
	Red porgy	*Pagrus pagrus*
	Saucereye porgy	*Calamus calamus*
	Scup	*Stenotomus chrysops*
	Sheepshead	*Archosargus probatocephalus*
	Whitebone porgy	*Calamus leucosteus*
Grunts (11 species)		
	Black margate	*Anistotremus surinamensis*
	Bluestriped grunt	*Haemulon sciurus*
	Cottonwick	*Haemulon melanurum*
	French grunt	*Haemulon flavolineatum*
	Margate	*Haemulon album*
	Porkfish	*Anisotremus virginicus*
	Sailor's choice	*Haemulon parra*
	Smallmouth grunt	*Haemulon chrysargeryum*
	Spanish grunt	*Haemulon macrostomum*
	Tomtate	*Haemulon aurolineatum*
	White grunt	*Haemulon plumieri*
Jacks (8 species)		
	Almaco jack	*Seriola rivoliana*
	Banded rudderfish	*Seriola zonata*
	Bar jack	*Caranx ruber*
	Blue runner	*Caranx crysos*
	Crevalle jack	*Caranx hippos*
	Greater amberjack	*Seriola dumerili*
	Lesser amberjack	*Seriola fasciata*
	Yellow jack	*Caranx bartholomaei*

Table 1. (*continued*)
Species Managed by the South Atlantic Fishery Management Council

Management Group or Subgroup	Common Name[1] or Description	Scientific Name[1] or Taxonomic Group
Tilefishes (3 species)		
	Blueline tilefish[2]	*Caulolatilus microps*
	Sand tilefish	*Malacanthus plumieri*
	Tilefish (AKA golden tilefish)[2]	*Lopholatilus chamaeleonticeps*
Triggerfishes (3 species)		
	Gray triggerfish	*Balistes capriscus*
	Ocean triggerfish	*Canthidermis sufflamen*
	Queen triggerfish	*Balistes vetula*
Wrasses (2 species)		
	Hogfish	*Lachnolaimus maximus*
	Puddingwife	*Halichoeres radiatus*
Spadefishes (1 species)		
	Atlantic spadefish	*Chaetodipterus faber*
COASTAL MIGRATORY PELAGICS FISHERY MANAGEMENT PLAN (2 families, 5 species)		
Cobia (1 species)		
	Cobia	*Rachycentron canadum*
Mackerels and Tunas (4 species)		
	Cero	*Scomberomorus regalis*
	Little tunny	*Euthynnus alletteratus*
	King mackerel	*Scomberomorus cavalla*
	Spanish mackerel	*Scomberomorus maculatus*
DOLPHINFISH WAHOO FISHERY MANAGEMENT PLAN (2 families; 3 species)		
Dolphinfishes (2 species managed as a single species)		
	Dolphinfish[3]	*Coryphaena hippurus*
	Pompano dolphinfish[3]	*Coryphaena equiselis*
Mackerels and Tunas (1 species)		
	Wahoo	*Acanthocybium solandri*

1 Common and scientific names generally follow Williams et al. (1989) for decapod crustaceans and Nelson et al. (2004) for fishes.

2 Known depth range or geographic range for species is well outside of project area.

3 Dolphinfish and pompano dolphinfish are managed as a single species (dolphinfish) (D. Dale *pers. comm*.).

Sources: South Atlantic Fishery Management Council (no date), D. Dale *pers. comm*., and P. Wilber *pers. comm*.

Compiled by: ANAMAR Environmental Consulting, Inc.

Table 2.
Atlantic Highly Migratory Species Managed by the National Marine Fisheries Service

Management Group or Subgroup	Common Name[1]	Scientific Name[1]
SMOOTHHOUND SHARKS (1 family, 2 species managed as a single species)		
	Florida smoothhound[2]	*Mustelus norrisi*
	Smooth dogfish[2]	*Mustelus canis*
LARGE COASTAL SHARKS (3 families, 11 species)		
Nurse Sharks (1 species)		
	Nurse shark	*Ginglymostoma cirratum*
Requiem Sharks (7 species)		
	Blacktip shark	*Carcharhinus limbatus*
	Bull shark	*Carcharhinus leucas*
	Lemon shark	*Negaprion brevirostris*
	Sandbar shark	*Carcharhinus plumbeus*
	Silky shark	*Carcharhinus falciformis*
	Spinner shark	*Carcharhinus brevipinna*
	Tiger shark	*Galeocerdo cuvier*
Hammerheads (3 species)		
	Great hammerhead	*Sphyrna mokarran*
	Scalloped hammerhead	*Sphyrna lewini*
	Smooth hammerhead	*Sphyrna zygaena*
SMALL COASTAL SHARKS (2 families, 4 species)		
Requiem Sharks (3 species)		
	Atlantic sharpnose shark	*Rhizoprionodon terraenovae*
	Blacknose shark	*Carcharinus acronotus*
	Finetooth shark	*Carcharhinus isodon*
Hammerheads (1 species)		
	Bonnethead	*Sphyrna tiburo*
PELAGIC SHARKS (3 families, 5 species)		
Threshers (1 species)		
	Common thresher	*Alopias vulpinus*
Mackerel Sharks (2 species)		
	Porbeagle[3]	*Lamna nasus*
	Shortfin mako	*Isurus oxyrinchus*
Requiem Sharks (2 species)		
	Blue shark[3]	*Prionace glauca*
	Oceanic whitetip shark[3]	*Carcharhinus longimanus*
PROHIBITED SHARKS (8 families, 19 species)		
Cow Sharks (3 species)		
	Bigeye sixgill shark[3]	*Hexanchus nakamurai*
	Bluntnose sixgill shark[3]	*Hexanchus griseus*
	Sharpnose sevengill shark[3]	*Heptranchias perlo*
Angel Sharks (1 species)		
	Atlantic angel shark	*Squatina dumeril*
Whale Sharks (1 species)		
	Whale shark	*Rhincodon typus*
Sand Tiger Sharks (2 species)		
	Bigeye sand tiger[4]	*Odontaspis noronhai*
	Sand tiger	*Carcharias taurus*
Threshers (1 species)		
	Bigeye thresher	*Alopias superciliosus*

Table 2. (*continued*)
Atlantic Highly Migratory Species Managed by the National Marine Fisheries Service

Management Group or Subgroup	Common Name[1]	Scientific Name[1]
Basking Sharks (1 species)		
	Basking shark	*Cetorhinus maximus*
Mackerel Sharks (1 family, 2 species)		
	White shark	*Carcharodon carcharias*
	Longfin mako	*Isurus paucus*
Requiem Sharks (8 species)		
	Bignose shark	*Carcharhinus altimus*
	Caribbean reef shark[3]	*Carcharhinus perezi*
	Caribbean sharpnose shark	*Rhizoprionodon porosus*
	Dusky shark	*Carcharhinus obscurus*
	Galapagos shark	*Carcharhinus galapagensis*
	Narrowtooth shark[3]	*Carcharhinus brachyurus*
	Night shark[3]	*Carcharhinus signatus*
	Smalltail shark[3]	*Carcharhinus porosus*
BILLFISH (1 family, 5 species)		
	Blue marlin[3]	*Makaira nigricans*
	Longbill spearfish[3]	*Tetrapturus pfluegeri*
	Roundscale spearfish[5]	*Tetrapturus georgii*
	Sailfish	*Istiophorus albicans*
	White marlin[3]	*Tetrapturus* (= *Kajikia*) *albidus*
SWORDFISH (1 species)		
	Swordfish[3]	*Xiphias gladius*
TUNAS (1 family, 5 species)		
	Albacore[3]	*Thunnus alalunga*
	Bigeye tuna[3]	*Thunnus obesus*
	Bluefin tuna[3]	*Thunnus thynnus*
	Skipjack tuna[3]	*Katsuwonus pelamis*
	Yellowfin tuna[3]	*Thunnus albacares*

1 Common and scientific names generally follow Nelson et al. (2004).

2 The Florida smoothhound and the smooth dogfish are managed as a single species (smooth dogfish) (NMFS 2010).

3 Known depth range or geographic range for species is well outside of project area.

4 Species is very rare, with only one published record from off Florida's east coast (Kerstetter and Taylor 2008), and one unpublished record between Miami and the Bahamas (M. Harris *pers. comm*., G. Hubbell *pers. comm*.).

5 Species planned for addition to the HMS management unit effective 01/01/11 (50 CFR § 600 and 635).

Sources: National Marine Fisheries Service (2009 and 2010), D. Dale *pers. comm*., and sources cited above.

Compiled by: ANAMAR Environmental Consulting, Inc.

Table 3.
Species Managed by the Mid-Atlantic Fishery Management Council

Management Group or Subgroup	Common Name[1]	Scientific Name[1]
ATLANTIC SURFCLAM AND OCEAN QUAHOG FISHERY MANAGEMENT PLAN (2 families, 2 species)		
Arcticidae (1 species)		
	Ocean quahog[2]	*Arctica islandica*
Mactridae (1 species)		
	Atlantic surfclam[2]	*Spisula solidissima*
ATLANTIC MACKEREL, SQUID, AND BUTTERFISH FISHERY MANAGEMENT PLAN (4 families, 4 species)		
Inshore Squid (1 species)		
	Longfin inshore squid	*Loligo pealeii*
Flying Squid (1 species)		
	Northern shortfin squid	*Illex illecebrosus*
Butterfishes (1 species)		
	Butterfish	*Peprilus triacanthus*
Mackerels (1 species)		
	Atlantic mackerel[2]	*Scomber scombrus*
DOGFISH FISHERY MANAGEMENT PLAN (1 species)		
Dogfish Sharks (1 species)		
	Spiny dogfish	*Squalus acanthias*
MONKFISH FISHERY MANAGEMENT PLAN (1 species)		
Goosefishes (1 species)		
	Goosefish (AKA monkfish)	*Lophius americanus*
TILEFISH FISHERY MANAGEMENT PLAN (1 species)		
Tilefishes (1 species)		
	Tilefish[2] (AKA golden tilefish)	*Lopholatilus chamaeleonticeps*
BLUEFISH FISHERY MANAGEMENT PLAN (1 species)		
Bluefishes (1 species)		
	Bluefish	*Pomatomus saltatrix*
SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS FISHERY MANAGEMENT PLAN (3 families, 3 species)		
Sea Basses (1 species)		
	Black sea bass	*Centropristis striata*
Porgies (1 species)		
	Scup	*Stenotomus chrysops*
Sand Flounders (1 species)		
	Summer flounder	*Paralichthys dentatus*

1 Common and scientific names follow Turgeon et al. (1998) for mollusks and Nelson et al. (2004) for fishes.
2 Known depth range or geographic range for species is well outside of project area.

Sources: National Marine Fisheries Service (2008) and MAFMC website (http://www.mafmc.org/fmp/fmp.htm) accessed 08/17/10.

Compiled by: ANAMAR Environmental Consulting, Inc.

ANAMAR Environmental Consulting, Inc.

Table 4.

EFH in the Vicinity of the Project Area Mapped by NOAA Fisheries for SAFMC-Managed Species

EFH in Vicinity of Project Area	EFH and HAPC Notes
SARGASSUM FISHERY MANAGEMENT PLAN (2 species)	
—	Sargassum EFH not identified in EFH Mapper.
CORAL, CORAL REEFS, AND LIVE/HARDBOTTOM HABITAT FISHERY MANAGEMENT PLAN (many species)	
All life stages (EFH mapped for Coral as a collective unit)	Small EFH square polygons appear to be within vicinity of project area, and possibly contained within project area. HAPC for Coral Reefs and Hardbottom appear to be in the vicinity of project area, and possibly contained within project area. EFH and HAPC mapped for the Coral, Coral Reefs, and Live/Hardbottom Habitat as a collective unit (not broken down by taxa or type). EFH and HAPC not broken down by life stages. Nearest *Oculina* Bank HAPC is far southeast of project site, associated with the edge of the continental shelf, off Palm Beach County
SHRIMP FISHERY MANAGEMENT PLAN (3 families, 6 species)	
—	Rock shrimp EFH not identified in EFH Mapper.
None (EFH mapped for penaeid shrimp as a collective unit)	Nearest EFH (identified as HAPC) appears to be inshore waters associated with the St. Johns and Nassau rivers, west of the project area. EFH mapped for penaeid shrimp as a family, and thus does not appear to address the Shrimp FMP as a whole.
—	Royal red shrimp EFH not identified in EFH Mapper.
SPINY LOBSTER FISHERY MANAGEMENT PLAN (1 species)	
All life stages	EFH appears to include project area and surrounding waters, including much of the inshore, nearshore, and offshore waters of the area. HAPC is identified nearby and southwest of the project site, in a discrete square polygon surrounding Atlantic Beach.
GOLDEN CRAB FISHERY MANAGEMENT PLAN (1 species)	
None	Nearest EFH is far east of project area, along and beyond the continental slope. No HAPC has been identified in EFH Mapper.
SNAPPER GROUPER COMPLEX FISHERY MANAGEMENT PLAN (10 families, 73 species)	
All life stages (EFH mapped for Snapper-Grouper Complex as a collective unit)	EFH includes project area and all surrounding waters, including inshore, nearshore, and most offshore waters from Florida to Virginia. HAPC identified near to project area, but nearer to shore, including much of the St. Johns and Nassau rivers. EFH and HAPC are for the Snapper-Grouper Complex as a collective unit.
COASTAL MIGRATORY PELAGICS FISHERY MANAGEMENT PLAN (2 families, 5 species)	
All life stages (EFH mapped for Coastal Migratory Pelagics as a collective unit)	Nearest EFH appears to be in the vicinity of the project site and identified as a circular polygon surrounding St. Johns Bar Cut. Another EFH polygon surrounds the entrance to Nassau Sound. Additional delineations appear in portions of the St. Johns and Nassau rivers. Mapped EFH is not broken down to species-level, but rather treats Coastal Migratory Pelagics as a whole unit. EFH not broken down by life stages. No HAPC is identified in the EFH Mapper.
DOLPHINFISH WAHOO FISHERY MANAGEMENT PLAN (2 families; 3 species)	
None (EFH mapped for Dolphinfish-Wahoo as a collective unit)	Nearest EFH is far northeast of project site, off South Carolina and is identified as HAPC. EFH not broken down by species or life stages.

Source: NOAA Fisheries EFH Mapper (NOAA Fisheries 2011)

Compiled by: ANAMAR Environmental Consulting, Inc.

Table 5.
EFH in Vicinity of Project Area Mapped by NOAA Fisheries for Atlantic Highly Migratory Species

Management Group and Species Name[1]	EFH in Vicinity of Project Area	EFH and HAPC Notes
SMOOTHHOUND SHARKS (1 family, 2 species managed as a single species)		
Florida smoothhound[2,3] *Mustelus norrisi* Smooth dogfish[2] *Mustelus canis*	None	Nearest EFH is off the South Carolina coast as well as the outer continental shelf waters of Florida's Gulf Coast. EFH is not broken down by smoothhound species (managed as a single species). No HAPC identified in EFH Mapper.
LARGE COASTAL SHARKS (3 families, 11 species)		
Nurse shark *Ginglymostoma cirratum*	All life stages	Juvenile and Adult EFH appear to include project area, and extend north and south along coastline, from nearshore to edge of continental shelf. Neonate EFH is not identified by EFH Mapper. No HAPC identified in EFH Mapper.
Blacktip shark *Carcharhinus limbatus*	All life stages	All life stage EFH appear to include the project area. Neonate EFH includes Jacksonville nearshore waters, and areas farther north along coastline. Juvenile and Adult EFH include most nearshore and inshore waters along Atlantic and Gulf coastal states. No HAPC identified in EFH Mapper.
Bull shark *Carcharhinus leucas*	Juvenile & Adult	Juvenile and Adult EFH appear to include project area, and extend north and south from nearshore to near edge of continental shelf. Nearest Neonate EFH is far south, associated with the Indian River Lagoon. No HAPC identified in EFH Mapper.
Lemon shark *Negaprion brevirostris*	Juvenile & Adult	Juvenile and Adult EFH appear to include project area, along with nearshore to offshore waters. Nearest Neonate EFH is far south, in Florida Keys and Florida Bay (nearshore and inshore waters). No HAPC identified in EFH Mapper.
Sandbar shark *Carcharhinus plumbeus*	All life stages	Juvenile and Adult EFH appear to include project area, and extend north and south from nearshore to outer continental shelf waters. Neonate EFH in vicinity of project area, and continues north in nearshore waters. Nearest HAPC is located off North Carolina and Virginia.
Silky shark *Carcharhinus falciformis*	None	Nearest EFH several miles east of project area, over deeper continental shelf waters. EFH not broken down by life stage. No HAPC identified in EFH Mapper.
Spinner shark *Carcharhinus brevipinna*	All life stages	All life stage EFH appear to include project area and extending north and south from nearshore to outer continental shelf waters. No HAPC identified in EFH Mapper.
Tiger shark *Galeocerdo cuvier*	All life stages	All life stage EFH appear to include project area and much of the continental shelf. EFH extends to continental slope and slightly beyond. No HAPC identified in EFH Mapper.
Great hammerhead *Sphyrna mokarran*	All life stages	All life stage EFH appear to include the project area, and extend farther north and south along coast, from nearshore to outer continental shelf waters. EFH not broken down by life stages in EFH Mapper. No HAPC identified in EFH Mapper.
Scalloped hammerhead *Sphyrna lewini*	All life stages	All life stage EFH appear to include the project area, and generally extend north and south along coastline. No HAPC identified in EFH Mapper.
Smooth hammerhead *Sphyrna zygaena*	—	Smooth hammerhead EFH not identified in EFH Mapper.

Table 5. (*continued*)
EFH in Vicinity of Project Area Mapped by NOAA Fisheries for Atlantic Highly Migratory Species

Management Group and Species Name[1]	EFH in Vicinity of Project Area	EFH and HAPC Notes
SMALL COASTAL SHARKS (2 families, 4 species)		
Atlantic sharpnose shark *Rhizoprionodon terraenovae*	All life stages	All three life stage EFH appear to include the project area or vicinity. EFH extends along continental shelf on both sides of Florida and adjacent states. No HAPC identified in EFH Mapper.
Blacknose shark *Carcharinus acronotus*	Juvenile & Adult	Juvenile and Adult EFH appears to include project area, and extends along both Florida coastlines from nearshore to approaching edge of continental shelf. Nearest Neonate EFG several miles north of project area, along coastline. No HAPC identified in EFH Mapper.
Finetooth shark *Carcharhinus isodon*	All life stages	Neonate EFH appears to include project area, extending farther north along coastline to Georgia and beyond. Juvenile and Adult EFH appears to include project area, along with much of Florida's east coast nearshore waters. No HAPC identified in EFH Mapper.
Bonnethead *Sphyrna tiburo*	All life stages	Neonate, Juvenile, and Adult EFH appears to include project area, extending along shallow coastal and inshore waters of Atlantic and Gulf coasts. No HAPC identified in EFH Mapper.
PELAGIC SHARKS (3 families, 5 species)		
Common thresher *Alopias vulpinus*	None	Nearest EFH is several miles south of project area, from nearshore to outer continental slope waters. Other EFH polygons include waters beyond continental slope. No HAPC identified in EFH Mapper.
Porbeagle[3] *Lamna nasus*	None	No EFH identified along Florida coastlines. Nearest EFH is relatively discrete area in Gulf of Mexico beyond continental slope, which appears to be used by juvenile porbeagles. No HAPC identified in EFH Mapper.
Shortfin mako *Isurus oxyrinchus*	None	Nearest EFH is far south and east of project area, associated with the continental slope. EFH is not broken down by life stage in EFH Mapper. No HAPC identified in EFH Mapper.
Blue shark[3] *Prionace glauca*	None	Nearest EFH is far east along and beyond the continental slope, and used by adult blue sharks. No HAPC identified in EFH Mapper.
Oceanic whitetip shark[3] *Carcharhinus longimanus*	None	Nearest EFH is far east along and beyond the continental slope. This EFH is not broken down by life stage. No HAPC identified in EFH Mapper.
PROHIBITED SHARKS (8 families, 19 species)		
Bigeye sixgill shark[3] *Hexanchus nakamurai*	—	Bigeye sixgill shark EFH not identified in EFH Mapper.
Bluntnose sixgill shark[3] *Hexanchus griseus*	—	Bluntnose sixgill shark EFH not identified in EFH Mapper.
Sharpnose sevengill shark[3] *Heptranchias perlo*	—	Sharpnose sevengill shark EFH not identified in EFH Mapper.
Atlantic angel shark *Squatina dumeril*	None	No EFH identified along Florida's east coast. Nearest EFH in Gulf of Mexico, off panhandle. No HAPC identified in EFH Mapper.
Whale shark *Rhincodon typus*	None	No EFH identified along Florida's east coast. Nearest EFH in Gulf of Mexico, off panhandle. No HAPC identified in EFH Mapper.
Bigeye sand tiger[4] *Odontaspis noronhai*	—	Bigeye sand tiger EFH not identified in EFH Mapper.
Sand tiger *Carcharias taurus*	Adult, possibly neonate	Adult EFH appears to include vicinity of project area in shallow shelf waters off Jacksonville. Juvenile EFH occurs just south of the project area. Neonate EFH in discrete polygons north and south of the project area. No HAPC identified in EFH Mapper.

Table 5. (*continued*)
EFH in Vicinity of Project Area Mapped by NOAA Fisheries for Atlantic Highly Migratory Species

Management Group and Species Name[1]	EFH in Vicinity of Project Area	EFH and HAPC Notes
Bigeye thresher *Alopias superciliosus*	None	Nearest EFH far southeast of project area, above continental slope and beyond. No HAPC identified in EFH Mapper.
Basking shark *Cetorhinus maximus*	None	No EFH identified along Florida coastlines. Nearest EFH found off North Carolina. No HAPC identified in EFH Mapper.
White shark *Carcharodon carcharias*	All life stages	All life stage EFH appear to include the project area. Life stages not broken down in EFH mapper. No HAPC identified in EFH Mapper.
Longfin mako *Isurus paucus*	None	Nearest EFH far east of project area, associated with continental slope and beyond. No HAPC identified in EFH Mapper.
Bignose shark *Carcharhinus altimus*	None	Nearest EFH far east of project area, loosely associated with the continental slope and beyond. No HAPC identified in EFH Mapper.
Caribbean reef shark *Carcharhinus perezi*	None	Nearest EFH far south of project area, from south Florida coastline to the continental slope. No HAPC identified in EFH Mapper.
Caribbean sharpnose shark[3] *Rhizoprionodon porosus*	—	Caribbean sharpnose shark EFH not identified in EFH Mapper.
Dusky shark *Carcharhinus obscurus*	Neonate, Juvenile, & Adult	All three life stage EFH appear to include the project area and the general vicinity. No HAPC identified in EFH Mapper.
Galapagos shark *Carcharhinus galapagensis*	—	Galapagos shark EFH not identified in EFH Mapper.
Narrowtooth shark[3] *Carcharhinus brachyurus*	—	Narrowtooth shark EFH not identified in EFH Mapper.
Night shark[3] *Carcharhinus signatus*	None	Nearest EFH far southeast of project area, associated with continental slope and beyond. No HAPC identified in EFH Mapper.
Smalltail shark[3] *Carcharhinus porosus*	—	Smalltail shark EFH not identified in EFH Mapper.
BILLFISH (1 family, 5 species)		
Blue marlin[3] *Makaira nigricans*	None	Nearest EFH far east of project area, above and beyond continental slope. Nearest spawning EFH is located far southeast of the project area. No HAPC identified in EFH Mapper.
Longbill spearfish[3] *Tetrapturus pfluegeri*	None	Nearest EFH far east by northeast of project area, associated with continental slope and beyond. No HAPC identified in EFH Mapper.
Roundscale spearfish[3,5] *Tetrapturus georgii*	—	Nearest roundscale spearfish EFH located far east of project area, beyond the continental slope.
Sailfish *Istiophorus albicans*	All life stages	Juvenile EFH appears to include project area, while adult EFH is farther south along coastline. Spawning EFH far south of project area. No HAPC identified in EFH Mapper.
White marlin[3] *Tetrapturus* (= *Kajikia*) *albidus*	None	Nearest EFH far east, associated with continental slope and beyond. No HAPC identified in EFH Mapper.
SWORDFISH (1 family, 1 species)		
Swordfish[3] *Xiphias gladius*	None	Nearest EFH far east of project area and appears to be associated with continental slope and abyssal waters. No HAPC identified in EFH Mapper.

Table 5. (*continued*)
EFH in Vicinity of Project Area Mapped by NOAA Fisheries for Atlantic Highly Migratory Species

Management Group and Species Name[1]	EFH in Vicinity of Project Area	EFH and HAPC Notes
TUNAS (1 family, 5 species)		
Albacore[3] *Thunnus alalunga*	None	Nearest EFH far southeast of project area, beyond continental slope. No HAPC identified in EFH Mapper.
Bigeye tuna[3] *Thunnus obesus*	None	Nearest EFH far northeast of project area and appears to be associated with continental slope and beyond. No HAPC identified in EFH Mapper.
Bluefin tuna[3] *Thunnus thynnus*	None	Nearest EFH far south by southeast of project area, associated with the Florida Current as well as waters east of continental slope. HAPC located within the Gulf of Mexico only.
Skipjack tuna[3] *Katsuwonus pelamis*	None	Nearest EFH far east by northeast of project area, associated with the continental slope. No HAPC identified in EFH Mapper.
Yellowfin tuna[3] *Thunnus albacares*	None	Nearest EFH far east by southeast of project area, associated with the continental slope and beyond. No HAPC identified in EFH Mapper.

[1] Common and scientific names generally follow Nelson et al. (2004).

[2] The Florida smoothhound and the smooth dogfish are managed as a single unit (smooth dogfish) (NMFS 2010).

[3] Known depth range or geographic range for species is well outside of project area.

[4] Species is very rare, with only one published record from off Florida's east coast (Kerstetter and Taylor 2008), and one unpublished record between Miami and the Bahamas (M. Harris *pers. comm*., G. Hubbell *pers. comm*.).

[5] Species planned for addition to the HMS management unit effective 01/01/11 (50 CFR § 600 and 635).

Source: NOAA Fisheries EFH Mapper (NOAA Fisheries 2011)

Compiled by: ANAMAR Environmental Consulting, Inc.

Table 6.
EFH in Vicinity of Project Area Mapped by NOAA Fisheries for MAFMC-Managed Species

Management Group and Species Name[1]	EFH in Vicinity of Project Area	EFH and HAPC Notes
ATLANTIC SURFCLAM AND OCEAN QUAHOG FISHERY MANAGEMENT PLAN (2 families, 2 species)		
Ocean quahog[2] *Artica islandica*	—	Ocean quahog EFH not identified in EFH Mapper.
Atlantic surfclam[2] *Spisula solidissima*	—	Atlantic surfclam EFH not identified in EFH Mapper.
ATLANTIC MACKEREL, SQUID, AND BUTTERFISH FISHERY MANAGEMENT PLAN (4 families, 4 species)		
Longfin inshore squid *Loligo pealeii*	—	Longfin inshore squid EFH not identified in EFH Mapper.
Northern shortfin squid *Illex illecebrosus*	—	Northern shortfin squid EFH not identified in EFH Mapper.
Butterfish *Peprilus triacanthus*	—	Butterfish EFH not identified in EFH Mapper.
Atlantic mackerel[2] *Scomber scombrus*	—	Atlantic mackerel EFH not identified in EFH Mapper.
DOGFISH FISHERY MANAGEMENT PLAN (1 species)		
Spiny dogfish *Squalus acanthias*	—	Spiny dogfish EFH not identified in EFH Mapper.
MONKFISH FISHERY MANAGEMENT PLAN (1 species)		
Goosefish (AKA monkfish) *Lophius americanus*	None	Nearest EFH is far northeast of the project site, off North Carolina. There is no HAPC identified for this species in the EFH Mapper.
TILEFISH FISHERY MANAGEMENT PLAN (1 species)		
Tilefish[2] (AKA golden tilefish) *Lopholatilus chamaeleonticeps*	None	Nearest EFH is far northeast of project site, along the continental slope off Virginia and northern North Carolina. Nearest HAPC is identified off Virginia associated with certain formations along the continental slope.
BLUEFISH FISHERY MANAGEMENT PLAN (1 species)		
Bluefish *Pomatomus saltatrix*	—	Bluefish EFH not identified in EFH Mapper.
SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS FISHERY MANAGEMENT PLAN (3 families, 3 species)		
Black sea bass *Centropristis striata*	—	Black sea bass EFH not identified in EFH Mapper.
Scup *Stenotomus chrysops*	—	Scup EFH not identified in EFH Mapper.
Summer flounder *Paralichthys dentatus*	—	Summer flounder EFH not identified in EFH Mapper.

[1] Common and scientific names follow Turgeon et al. (1998) for mollusks and Nelson et al. (2004) for fishes.
[2] Known depth range or geographic range for species is well outside of project area.

Source: NOAA Fisheries EFH Mapper (NOAA Fisheries 2011)
Compiled by: ANAMAR Environmental Consulting, Inc.

APPENDIX E

Air Quality Evaluation

Draft Environmental Impact Statement
for
Designation of an Ocean Dredged Material Disposal Site Offshore of Jacksonville, Florida

United States
Environmental Protection
Agency

U.S. EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303

APPENDIX E
AIR QUALITY ANALYSIS

Air quality emissions were estimated for the three alternative sites and the No Action Alternative evaluated in this EIS. The following is a discussion of the variables, references, and methods used to perform the air emission calculations for operations associated with transport of dredged material to the ODMDS.

Air quality impacts from dredge material disposal activities were estimated from combustion emissions of fossil fuel-powered equipment used for transporting dredged material to the ODMDS. Factors needed to derive the source emission rates were obtained from *Compilation of Air Pollution Emission Factors, AP-42, Volume 1* (USEPA 1995), Table 3.3-1. Load factors (LF) were estimated at 60 percent for the hopper dredge and tugboat engines. Tugs and hopper dredges would be carrying a full load to the disposal site and returning to the dredge site empty. Information on dredge volumes, barge and hopper capacity, number of trips to the ODMDS per day, speed and horsepower of hopper dredge, tugboat, and survey vessel was provided by USACE Jacksonville District and Norfolk Dredging personnel.

To provide a minimum and maximum range of total emissions, each alternative was evaluated based on two dredging volume scenarios:

Scenario 1: Average Annual Maintenance Dredged Material Volume = 500,000 cy
Scenario 2: Maximum Annual Volume of New Work Material during Jacksonville Harbor Deepening = 5.3 million cy

The average annual maintenance material volume of 500,000 cy is based on Naval Station Mayport estimates and does not include potential maintenance material generated from the Jacksonville Harbor Navigation Project or other entities.

The annual volume of 5.3 million cy of new work material is based on a total maximum volume of 32 million cy generated during the entire Jacksonville Harbor Deepening Project divided by 6 years which is the estimated time needed to complete the project.

In all scenarios, two types of equipment are evaluated for transporting dredged material to the ODMDS: tugboat/scow (associated with clamshell dredging) and hopper dredge (able to self propel to disposal sites).

Variables used to calculate emissions

Dredged material volumes used in Scenarios 1 and 2

Distance to alternative ODMDS = 7.1 nmi to Alternative Site 1, 7.4 nmi to Alternative Site 2, 5.9 nmi to Alternative Site 3, and 9.0 nmi to Fernandina Beach ODMDS (No Action Alternative)

Barge capacity (volume per trip) = 4,500 cy

Hopper capacity (volume per trip) = 4,000 cy (about 60% of carrying capacity)

Trips per day for tugboat = 2-4 round trips per day to the ODMDS

Trips per day for hopper dredge = 3-3.8 round trips per day to the ODMDS

Speed of tugboat = 10.0 mph

Speed of hopper dredge = 10 mph

Horsepower of tugboat = 3,200 Hp

Horsepower of *Liberty Island* hopper dredge = 9,920 Hp

Survey Vessel S "Florida" used is for surveys of ODMDS. Vessel runs at about 5 knots when collecting data and 15 knots when transiting. It has two Detroit diesel engines rated at 400-Hp. Surveys take place once a year on average, and it takes about two days to survey the ODMDS.

Emissions were calculated using the following equation:

EMS = EF * HP * LF * Hr/day * # days

Where:

EMS = estimated emissions (lbs)

EF = emission factors pounds per horsepower hours

HP = peak horsepower

LF = load factor (assumed percentage of peak horsepower)

Hr/day = Hours per day that tugboat or hopper dredge is transiting to and from the ODMDS = [Distance to Alternative Site * 2 (round trip)/ 10.0 mph (speed of tugboat/hopper dredge) + 0.2 hours (estimated dump time)] * trips per day

days = # of days to transport total volume of material to ODMDS

Total Emissions on an Annual Basis for Each Alternative Using a Clamshell Dredge

Scenario 1: Average Annual Maintenance Dredged Material Volume

Alternative	VOC	CO	NOx	SO2	PM
	tons/year	*tons/year*	*tons/year*	*tons/year*	*tons/year*
Alternative 1	0.435	1.228	5.456	0.361	0.387
Alternative 2	0.451	1.273	5.654	0.374	0.401
Alternative 3	0.371	1.050	4.662	0.308	0.331
No Action	0.535	1.511	6.713	0.444	0.476

Scenario 2: Maximum Annual Volume of New Work Material during Jacksonville Harbor Deepening

Alternative	VOC	CO	NOx	SO2	PM
	tons/year	*tons/year*	*tons/year*	*tons/year*	*tons/year*
Alternative 1	4.53	12.81	56.88	3.76	4.04
Alternative 2	4.70	13.28	58.98	3.90	4.19
Alternative 3	3.86	10.91	48.47	3.21	3.44
No Action	5.59	15.81	70.20	4.64	4.98

Total Emissions on an Annual Basis for Each Alternative Using a Hopper Dredge

Scenario 1: Average Annual Maintenance Dredged Material Volume

Alternative	VOC	CO	NOx	SO2	PM
	tons/year	*tons/year*	*tons/year*	*tons/year*	*tons/year*
Alternative 1	1.496	4.229	18.781	1.242	1.333
Alternative 2	1.552	4.385	19.473	1.288	1.382
Alternative 3	1.276	3.606	16.013	1.059	1.136
No Action	1.846	5.215	23.163	1.532	1.644

Scenario 2: Maximum Annual Volume of New Work Material during Jacksonville Harbor Deepening

Alternative	VOC	CO	NOx	SO2	PM
	tons/year	*tons/year*	*tons/year*	*tons/year*	*tons/year*
Alternative 1	15.79	44.61	198.13	13.10	14.06
Alternative 2	16.37	46.26	205.46	13.59	14.58
Alternative 3	13.45	38.00	168.79	11.16	11.98
No Action	19.49	55.07	244.58	16.17	17.36

Air Quality Analysis for Alternative 1 - Expansion of Jacksonville ODMDS

Alternative 1 covers an area of 3.83 square nautical miles, and the center of the site is located about 7.1 nmi southeast of the mouth of the St. Johns River.

CLAMSHELL DREDGING

Scenarios	Total volume of material to be transported to ODMDS annually (cy)	Vol per Trip	Total Trips	Average trips per day	Days
Scenario 1: Average Annual Maintenance Dredged Material Volume	500,000	4500	111	2	56
Scenario 2: Maximum Annual Volume of New Work Material during Jax Harbor Deepening	5,300,000	4500	1,178	4	294

Barges and a tugboat would be used to transport dredged material to the ODMDS. Assuming that a 6,000 cy capacity barge is used, there would be an estimated 4,500 cy per load.

For Scenario 2, assume two barges and two tugboats would be used during deepening project. This allows an average of 4 trips per day to the ODMDS.

Scenario 1 - Maintenance Material

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Tugboat - Main	1	3.2	56	3200	0.6	0.00247	0.00698	0.031	0.00205	0.0022	854	2412	10714	708	760	0.427	1.206	5.357	0.354	0.380
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**869**	**2457**	**10912**	**722**	**774**	**0.435**	**1.228**	**5.456**	**0.361**	**0.387**

Scenario 2 - New Work Material

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Tugboat - Main	1	6.5	294	3200	0.6	0.00247	0.00698	0.031	0.00205	0.0022	9048	25570	113564	7510	8059	4.524	12.785	56.782	3.755	4.030
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.007904	0.022336	0.0992	0.00656	0.00704
Total Emissions											**9064**	**25615**	**113763**	**7523**	**8073**	**4.532**	**12.807**	**56.881**	**3.762**	**4.037**

* Hours per day that tugboat is transiting to and from ODMDS = [Distance to Alternative Site * 2 (round trip)/ 10.0 mph (speed of tugboat) + 0.2 hours (estimated dump time)] * trips per day. Assume 8 hours/day for survey vessel.

HP = horsepower; LF = load factor

Air Quality Analysis for Alternative 1 - Expansion of Jacksonville ODMDS

Alternative 1 covers an area of 3.83 square nautical miles, and the center of the site is located about 7.1 nmi southeast of the mouth of the St. Johns River.

HOPPER DREDGING

Scenarios	Total volume of material to be transported to ODMDS annually (cy)	Vol per Trip	Total Trips	Average trips per day	Days/Year
Scenario 1: Average Annual Maintenance Dredged Material Volume	500,000	4000	125	3	42
Scenario 2: Maximum Annual Volume of New Work Material during Jax Harbor Deepening	5,300,000	4000	1,325	3.8	349

A hopper dredge would be used to transport dredged material to the ODMDS. Assuming that a dredge similar to the *Liberty Island* is used which has a capacity of 6,540 cy capacity, there would be an estimated 4,000 cy per load (assuming approximately 60% carrying capacity).

Scenario 1 - Maintenance Material

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Hopper Dredge - Propulsion	1	4.9	42	9920	0.6	0.00247	0.00698	0.031	0.00205	0.0022	2977	8413	37364	2471	2652	1.489	4.206	18.682	1.235	1.326
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**2993**	**8458**	**37562**	**2484**	**2666**	**1.496**	**4.229**	**18.781**	**1.242**	**1.333**

Scenario 2 - New Work Material

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Hopper Dredge - Propulsion	1	6.2	349	9920	0.6	0.00247	0.00698	0.031	0.00205	0.0022	31557	89176	396055	26191	28107	15.778	44.588	198.028	13.095	14.054
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**31572**	**89221**	**396253**	**26204**	**28121**	**15.786**	**44.610**	**198.127**	**13.102**	**14.061**

* Hours per day that hopper dredge is transiting to and from ODMDS = [Distance to Alternative Site * 2 (round trip)/ 10.0 mph (speed of tugboat) + 0.2 hours (estimated dump time)] * trips per day. Assume 8 hours/day for survey vessel.

HP = horsepower; LF = load factor

Air Quality Analysis for Alternative 2 - South of Jacksonville ODMDS

Alternative 2 covers an area of 4 square nautical miles, and the center of the site is located about 7.4 nmi southeast of the mouth of the St. Johns River.

CLAMSHELL DREDGING

Scenarios	Total volume of material to be transported to ODMDS annually (cy)	Vol per Trip	Total Trips	Average trips per day	Days/Year
Scenario 1: Average Annual Maintenance Dredged Material Volume	500,000	4500	111	2	56
Scenario 2: Maximum Annual Volume of New Work Material during Jax Harbor Deepening	5,300,000	4500	1,178	4	294

Barges and a tugboat would be used to transport dredged material to the ODMDS. Assuming that a 6,000 cy capacity barge is used, there would be an estimated 4,500 cy per load.

For Scenario 2, assume two barges and two tugboats would be used during deepening project. This allows an average of 4 trips per day to the ODMDS.

Scenario 1 - Maintenance Material

						VOC	**CO**	**NOx**	**SO2**	**PM**	**VOC**	**CO**	**NOx**	**SO2**	**PM**	**VOC**	**CO**	**NOx**	**SO2**	**PM**
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Tugboat - Main	1	3.4	56	3200	0.6	0.00247	0.00698	0.031	0.00205	0.0022	885	2502	11110	735	788	0.443	1.251	5.555	0.367	0.394
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**901**	**2546**	**11309**	**748**	**803**	**0.451**	**1.273**	**5.654**	**0.374**	**0.401**

Scenario 2 - New Work Material

						VOC	**CO**	**NOx**	**SO2**	**PM**	**VOC**	**CO**	**NOx**	**SO2**	**PM**	**VOC**	**CO**	**NOx**	**SO2**	**PM**
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Tugboat - Main	1	6.7	294	3200	0.6	0.00247	0.00698	0.031	0.00205	0.0022	9384	26517	117770	7788	8358	4.692	13.259	58.885	3.894	4.179
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**9399**	**26562**	**117969**	**7801**	**8372**	**4.700**	**13.281**	**58.984**	**3.901**	**4.186**

* Hours per day that tugboat is transiting to and from ODMDS = [Distance to Alternative Site * 2 (round trip)/ 10.0 mph (speed of tugboat) + 0.2 hours (estimated dump time)] * trips per day. Assume 8 hours/day for survey vessel.

HP = horsepower; LF = load factor

Air Quality Analysis for Alternative 2 - South of Jacksonville ODMDS

Alternative 2 covers an area of 4 square nautical miles, and the center of the site is located about 7.4 nmi southeast of the mouth of the St. Johns River.

HOPPER DREDGING

Scenarios	Total volume of material to be transported to ODMDS annually (cy)	Vol per Trip	Total Trips	Average trips per day	Days/Year
Scenario 1: Average Annual Maintenance Dredged Material Volume	500,000	4000	125	3	42
Scenario 2: Maximum Annual Volume of New Work Material during Jax Harbor Deepening	5,300,000	4000	1,325	3.8	349

A hopper dredge would be used to transport dredged material to the ODMDS. Assuming that a dredge similar to the *Liberty Island* is used which has a capacity of 6,540 cy capacity, there would be an estimated 4,000 cy per load (assuming approximately 60% carrying capacity).

Scenario 1 - Maintenance Material

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Hopper Dredge - Propulsion	1	5.0	42	9920	0.6	0.00247	0.00698	0.031	0.00205	0.0022	3087	8724	38748	2562	2750	1.544	4.362	19.374	1.281	1.375
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**3103**	**8769**	**38946**	**2575**	**2764**	**1.552**	**4.385**	**19.473**	**1.288**	**1.382**

Scenario 2 - New Work Material

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Hopper Dredge - Propulsion	1	6.4	349	9920	0.6	0.00247	0.00698	0.031	0.00205	0.0022	32725	92479	410724	27161	29148	16.363	46.240	205.362	13.580	14.574
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**32741**	**92524**	**410922**	**27174**	**29162**	**16.371**	**46.262**	**205.461**	**13.587**	**14.581**

* Hours per day that hopper dredge is transiting to and from ODMDS = [Distance to Alternative Site * 2 (round trip)/ 10.0 mph (speed of tugboat) + 0.2 hours (estimated dump time)] * trips per day. Assume 8 hours/day for survey vessel.

HP = horsepower; LF = load factor

Air Quality Analysis for Alternative 3 - North of Jacksonville ODMDS

Alternative 3 covers an area of 4 square nautical miles, and the center of the site is located about 5.9 nmi southeast of the mouth of the St. Johns River.

CLAMSHELL DREDGING

Scenarios	Total volume of material to be transported to ODMDS annually (cy)	Vol per Trip	Total Trips	Average trips per day	Days/Year
Scenario 1: Average Annual Maintenance Dredged Material Volume	500,000	4500	111	2	56
Scenario 2: Maximum Annual Volume of New Work Material during Jax Harbor Deepening	5,300,000	4500	1,178	4	294

Barges and a tugboat would be used to transport dredged material to the ODMDS. Assuming that a 6,000 cy capacity barge is used, there would be an estimated 4,500 cy per load.

For Scenario 2, assume two barges and two tugboats would be used during deepening project. This allows an average of 4 trips per day to the ODMDS.

Scenario 1 - Maintenance Material

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Tugboat - Main	1	2.8	56	3200	0.6	0.00247	0.00698	0.031	0.00205	0.0022	727	2055	9126	604	648	0.364	1.027	4.563	0.302	0.324
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**743**	**2100**	**9325**	**617**	**662**	**0.371**	**1.050**	**4.662**	**0.308**	**0.331**

Scenario 2 - New Work Material

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Tugboat - Main	1	5.5	294	3200	0.6	0.00247	0.00698	0.031	0.00205	0.0022	7708	21782	96740	6397	6865	3.854	10.891	48.370	3.199	3.433
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**7724**	**21827**	**96938**	**6410**	**6879**	**3.862**	**10.913**	**48.469**	**3.205**	**3.440**

* Hours per day that tugboat is transiting to and from ODMDS = [Distance to Alternative Site * 2 (round trip)/ 10.0 mph (speed of tugboat) + 0.2 hours (estimated dump time)] * trips per day. Assume 8 hours/day for survey vessel.

HP = horsepower; LF = load factor

Air Quality Analysis for Alternative 3 - North of Jacksonville ODMDS

Alternative 3 covers an area of 4 square nautical miles, and the center of the site is located about 5.9 nmi southeast of the mouth of the St. Johns River.

HOPPER DREDGING

Scenarios	Total volume of material to be transported to ODMDS annually (cy)	Vol per Trip	Total Trips	Average trips per day	Days/Year
Scenario 1: Average Annual Maintenance Dredged Material Volume	500,000	4000	125	3	42
Scenario 2: Maximum Annual Volume of New Work Material during Jax Harbor Deepening	5,300,000	4000	1,325	3.8	349

A hopper dredge would be used to transport dredged material to the ODMDS. Assuming that a dredge similar to the *Liberty Island* is used which has a capacity of 6,540 cy capacity, there would be an estimated 4,000 cy per load (assuming approximately 60% carrying capacity).

Scenario 1 - Maintenance Material

						VOC	**CO**	**NOx**	**SO2**	**PM**	**VOC**	**CO**	**NOx**	**SO2**	**PM**	**VOC**	**CO**	**NOx**	**SO2**	**PM**
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Hopper Dredge - Propulsion	1	4.1	42	9920	0.6	0.00247	0.00698	0.031	0.00205	0.0022	2536	7167	31828	2105	2259	1.268	3.583	15.914	1.052	1.129
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**2552**	**7211**	**32027**	**2118**	**2273**	**1.276**	**3.606**	**16.013**	**1.059**	**1.136**

Scenario 2 - New Work Material

						VOC	**CO**	**NOx**	**SO2**	**PM**	**VOC**	**CO**	**NOx**	**SO2**	**PM**	**VOC**	**CO**	**NOx**	**SO2**	**PM**
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Hopper Dredge - Propulsion	1	5.2	349	9920	0.6	0.00247	0.00698	0.031	0.00205	0.0022	26882	75965	337380	22311	23943	13.441	37.982	168.690	11.155	11.972
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**26897**	**76010**	**337579**	**22324**	**23957**	**13.449**	**38.005**	**168.789**	**11.162**	**11.979**

* Hours per day that hopper dredge is transiting to and from ODMDS = [Distance to Alternative Site * 2 (round trip)/ 10.0 mph (speed of tugboat) + 0.2 hours (estimated dump time)] * trips per day. Assume 8 hours/day for survey vessel.

HP = horsepower; LF = load factor

Air Quality Analysis for No Action Alternative - Fernandina Beach ODMDS

The Fernandina Beach ODMDS covers an area of 4 square nautical miles, and the center of the site is located about 9.0 nmi southeast of the mouth of the St. Johns River.

CLAMSHELL DREDGING

Scenarios	Total volume of material to be transported to ODMDS annually (cy)	Vol per Trip	Total Trips	Average trips per day	Days/Year
Scenario 1: Average Annual Maintenance Dredged Material Volume	500,000	4500	111	2	56
Scenario 2: Maximum Annual Volume of New Work Material during Jax Harbor Deepening	5,300,000	4500	1,178	4	294

Barges and a tugboat would be used to transport dredged material to the ODMDS. Assuming that a 6,000 cy capacity barge is used, there would be an estimated 4,500 cy per load.

For Scenario 2, assume two barges and two tugboats would be used during deepening project. This allows an average of 4 trips per day to the ODMDS.

Scenario 1 - Maintenance Material

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Tugboat - Main	1	4.0	56	3200	0.6	0.00247	0.00698	0.031	0.00205	0.0022	1054	2978	13227	875	939	0.527	1.489	6.613	0.437	0.469
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**1070**	**3023**	**13425**	**888**	**953**	**0.535**	**1.511**	**6.713**	**0.444**	**0.476**

Scenario 2 - New Work Material

						VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM	VOC	CO	NOx	SO2	PM
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Tugboat - Main	1	8.0	294	3200	0.6	0.00247	0.00698	0.031	0.00205	0.0022	11171	31568	140203	9271	9950	5.585	15.784	70.101	4.636	4.975
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**11187**	**31613**	**140401**	**9285**	**9964**	**5.593**	**15.806**	**70.201**	**4.642**	**4.982**

* Hours per day that tugboat is transiting to and from ODMDS = [Distance to Alternative Site * 2 (round trip)/ 10.0 mph (speed of tugboat) + 0.2 hours (estimated dump time)] * trips per day. Assume 8 hours/day for survey vessel.

HP = horsepower; LF = load factor

Air Quality Analysis for No Action Alternative - Fernandina Beach ODMDS

The Fernandina Beach ODMDS covers an area of 4 square nautical miles, and the center of the site is located about 9.0 nmi southeast of the mouth of the St. Johns River.

HOPPER DREDGING

Scenarios	Total volume of material to be transported to ODMDS annually (cy)	Vol per Trip	Total Trips	Average trips per day	Days/Year
Scenario 1: Average Annual Maintenance Dredged Material Volume	500,000	4000	125	3	42
Scenario 2: Maximum Annual Volume of New Work Material during Jax Harbor Deepening	5,300,000	4000	1,325	3.8	349

A hopper dredge would be used to transport dredged material to the ODMDS. Assuming that a dredge similar to the *Liberty Island* is used which has a capacity of 6,540 cy capacity, there would be an estimated 4,000 cy per load (assuming approximately 60% carrying capacity).

Scenario 1 - Maintenance Material

						VOC	**CO**	**NOx**	**SO2**	**PM**	**VOC**	**CO**	**NOx**	**SO2**	**PM**	**VOC**	**CO**	**NOx**	**SO2**	**PM**
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Hopper Dredge - Propulsion	1	6.0	42	9920	0.6	0.00247	0.00698	0.031	0.00205	0.0022	3675	10386	46128	3050	3274	1.838	5.193	23.064	1.525	1.637
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**3691**	**10431**	**46326**	**3064**	**3288**	**1.846**	**5.215**	**23.163**	**1.532**	**1.644**

Scenario 2 - New Work Material

						VOC	**CO**	**NOx**	**SO2**	**PM**	**VOC**	**CO**	**NOx**	**SO2**	**PM**	**VOC**	**CO**	**NOx**	**SO2**	**PM**
Equipment	*# of vessels*	*Hr/day**	*# Days/yr*	*HP*	*LF*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/hp-hr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*lb/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*	*tons/yr*
Hopper Dredge - Propulsion	1	7.6	349	9920	0.6	0.00247	0.00698	0.031	0.00205	0.0022	38959	110094	488957	32334	34700	19.479	55.047	244.478	16.167	17.350
Survey Vessel	1	8.0	2	400	1	0.00247	0.00698	0.031	0.00205	0.0022	16	45	198	13	14	0.008	0.022	0.099	0.007	0.007
Total Emissions											**38975**	**110139**	**489155**	**32347**	**34714**	**19.487**	**55.069**	**244.578**	**16.174**	**17.357**

* Hours per day that hopper dredge is transiting to and from ODMDS = [Distance to Alternative Site * 2 (round trip)/ 10.0 mph (speed of tugboat) + 0.2 hours (estimated dump time)] * trips per day. Assume 8 hours/day for survey vessel.

HP = horsepower; LF = load factor

APPENDIX F

Site Management and Monitoring Plan

Draft Environmental Impact Statement for Designation of an Ocean Dredged Material Disposal Site Offshore of Jacksonville, Florida

U.S. EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303

The following Site Management and Monitoring Plan for the Jacksonville ODMDS has been developed and agreed to pursuant to the Water Resources Development Act Amendments of 1992 (WRDA 92) to the Marine Protection, Research, and Sanctuaries Act of 1972 for the management and monitoring of ocean disposal activities, as resources allow, by the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers.

______________________	________	__________________	________
Colonel Alfred A. Pantano District Commander Jacksonville District U.S. Army Corps of Engineers Jacksonville, Florida	Date	Gwendolyn Keyes Fleming Regional Administrator U.S. Environmental Protection Agency Region 4 Atlanta, Georgia	Date

This plan is effective from the date of signature for a period not to exceed 10 years. The plan shall be reviewed and revised more frequently if site use and conditions at site indicate a need for revision.

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DRAFT
JACKSONVILLE (EXPANDED) OCEAN DREDGED MATERIAL DISPOSAL SITE (ODMDS)
SITE MANAGEMENT AND MONITORING PLAN

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1.0 INTRODUCTION

It is the responsibility of the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) under the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972 to manage and monitor each of the Ocean Dredged Material Disposal Sites (ODMDSs) designated by the EPA pursuant to Section 102 of MPRSA. Section 102(c)(3) of the MPRSA requires development of a Site Management and Monitoring Plan (SMMP) for each ODMDS and review and revision of the SMMP not less frequently than every 10 years. The 1996 document, *Guidance Document for Development of Site Management Plans for Ocean Dredged Material Disposal Sites* (EPA/USACE, 1996) and the EPA, Region 4 and USACE South Atlantic Division Memorandum of Understanding (EPA/USACE, 2007) have been used as guidance in developing this SMMP.

A SMMP was first developed for the Jacksonville ODMDS in June 1997. It was revised in 2007 and further modified in 2010. This current revision to the Jacksonville ODMDS SMMP incorporates the expanded boundaries of the ODMDS. The SMMP provisions shall be requirements for all dredged material disposal activities at the site. All MPRSA Section 103 ocean disposal permits or contract specifications shall be conditioned as necessary to assure consistency with the SMMP.

1.1 Site Management and Monitoring Plan Team. An interagency SMMP team was established to assist EPA and USACE in developing the 1997 Jacksonville ODMDS SMMP. The team consisted of the following agencies and their respective representatives:

- USACE Jacksonville District
- State of Florida (Coastal Zone Management Office)
- EPA Region 4
- U.S. Navy (Naval Station Mayport)
- Port of Jacksonville
- National Marine Fisheries Service (NMFS)
- U.S. Coast Guard

These agencies will continue to be consulted in revisions to the Jacksonville ODMDS SMMP. The team will assist EPA and USACE on deciding appropriate disposal practices, appropriate monitoring techniques, the level of monitoring, the significance of results, and potential management options.

Specific responsibilities of EPA and the USACE Jacksonville District are:

EPA: EPA is responsible for designating/de-designating MPRSA Section 102 ODMDSs, for evaluating environmental effects of disposal dredged material at these sites and for reviewing and concurring on dredged material suitability determinations.

USACE: USACE is responsible for evaluating dredged material suitability, issuing MPRSA Section 103 permits, regulating site use, and developing and implementing disposal monitoring programs.

2.0 SITE MANAGEMENT

Section 228.3 of the Ocean Dumping Regulations (40 CFR 220-229) states: "Management of a site consists of regulating times, rates, and methods of disposal and quantities and types of materials disposed of; developing and maintaining effective ambient monitoring programs for the site; conducting disposal site evaluation studies; and recommending modifications in site use and/or designation."

2.1 Disposal Site Characteristics

Alternative 1: Expansion of the Existing Jacksonville ODMDS

The designation of the expanded Jacksonville ODMDS can be found in 40 CFR 228.15(h)(X). The site is located 4.4 nmi offshore and is 3.7 nautical mile (nmi) by 1.3 nmi in size (4.83 nmi^2) (Figure 1a). As of 2011, it had a depth range of 9 to 20 meters (30 to 66 feet), with an average depth of 17 meters (56 feet). The site is centered at approximately 30° 19.671'N latitude and 81° 17.771'W longitude (NAD 83) or state plane coordinates 2179282 ft N and 562723 ft E (NAD83). The site coordinates are as follows:

	Geographic (NAD83)		State Plane (FL East 0901 Ft NAD83)	
Center				
NW Corner	30°21.514'N	81°18.549'W	2190467 N	558614 E
NE Corner	30°21.514'N	81°17.417'W	2190451 N	564609 E
NE Bend	30°21.001'N	81°17.013'W	2187340 N	566729 E
SW Corner	30°17.826'N	81°18.536'W	2168114 N	558665 E
SE Corner	30°17.829'N	81°17.004'W	2168112 N	566728 E

Alternative 2: Jacksonville ODMDS North and South

The designation of the original Jacksonville ODMDS, referred to as Jacksonville ODMDS North, can be found in 40 CFR 228.15(h)(9). The designation of the new ODMDS, referred to as Jacksonville ODMDS South, can be found in 40 CFR 228.15(h)(X).

The Jacksonville ODMDS North is 4.4 nmi offshore and is 1 nmi by 1 nmi in size (1 nmi^2) (Figure 1b). As of 2007, it had a depth range of 10 to 18 meters (32 to 60 feet), with an average depth of 14 meters (46 feet). The site is centered at the coordinates 30E 21.00'N latitude and 81E 18.00'W longitude (NAD 27) or state plane coordinates 2,187,428.7 ft N and 561,602.6 ft E (NAD83). The site coordinates are as follows:

	Geographic (NAD27)		Geographic (NAD83)		State Plane (FL East 0901 Ft NAD83)	
Center	30° 21.00'N	81° 18.00'W	30° 21.02'N	81° 17.99'W	2187429 N	561603 E
NW Corner	30° 21.50'N	81° 18.57'W	30° 21.52'N	81° 18.56'W	2190467 N	558614 E
NE Corner	30° 21.50'N	81° 17.43'W	30° 21.52'N	81° 17.42'W	2190451 N	564609 E
SW Corner	30° 20.50'N	81° 18.57'W	30° 20.52'N	81° 18.56'W	2184406 N	558597 E
SE Corner	30° 20.50'N	81° 17.43'W	30° 20.52'N	81° 17.42'W	2184390 N	564592 E

The new Jacksonville ODMDS South is 4.4 nmi offshore and is 2 nmi by 2 nmi in size (4-nmi^2) (Figure 1b). The new site approximately 1 nmi south of the southernmost boundary of the existing Jacksonville ODMDS. The center of the site is 7.4 nmi southeast of the mouth of the St. Johns River. Water depths at this site range from 13 to 20 meters (44 to 64 feet), with an average depth of 18 meters (55 feet). The site coordinates are as follows:

	Geographic (NAD83)		State Plane (FL East 0901 Ft NAD83)	
Center	30° 18.762'N	81° 17.300'W	2173767 N	565185 E
NW Corner	30° 19.692'N	81° 18.544'W	2179422 N	558658 E
NE Corner	30° 19.697'N	81° 16.062'W	2179419 N	571707 E
SW Corner	30° 17.826'N	81° 18.536'W	2168114 N	558665 E
SE Corner	30° 17.831'N	81° 16.056'W	2168111 N	571710 E

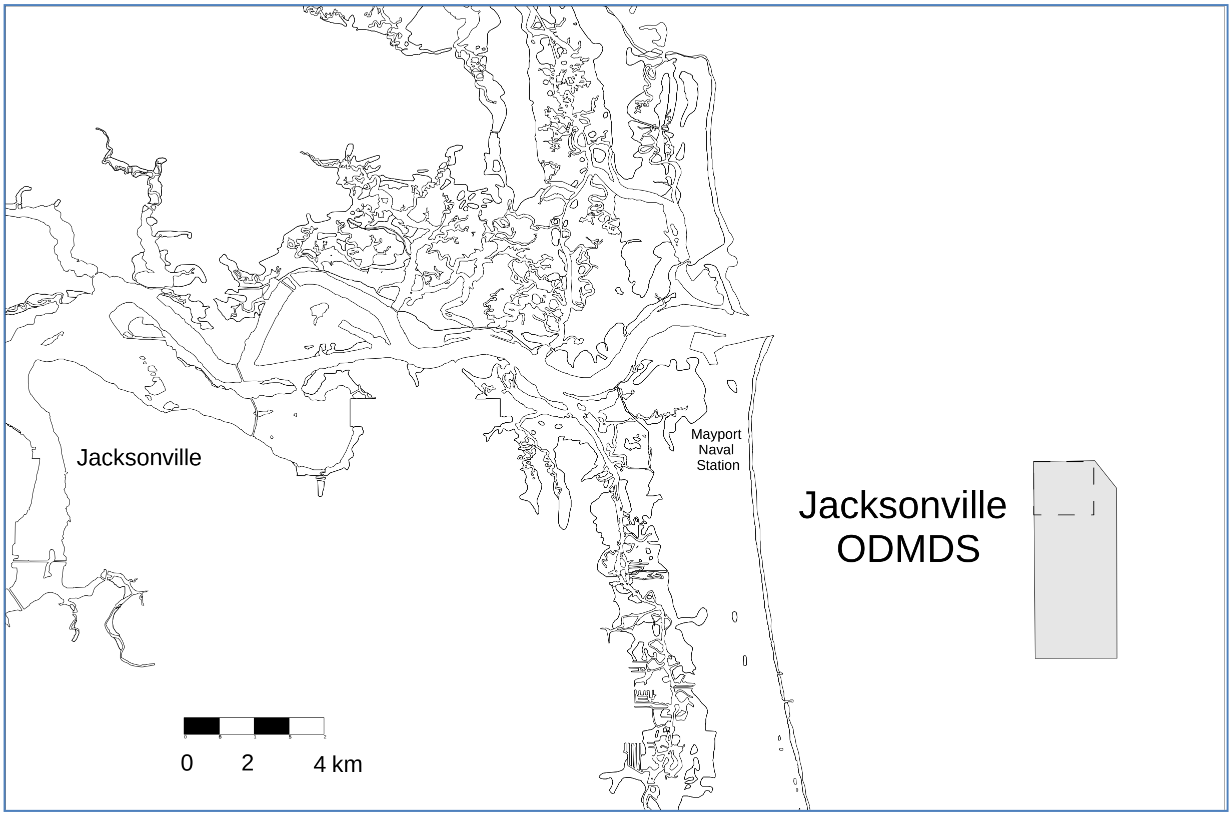


Figure 1(a). Jacksonville ODMDS Location Map – Alternative 1

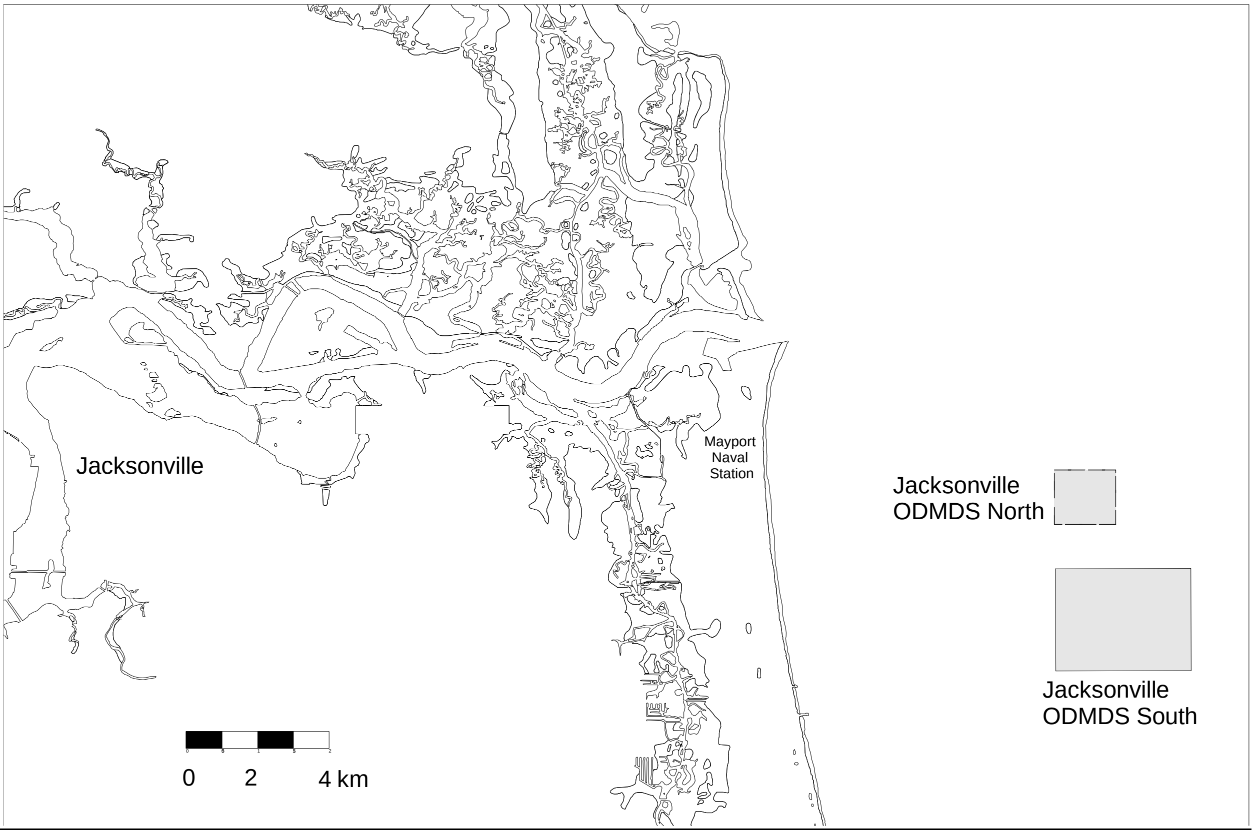


Figure 1(b): Jacksonville ODMDS Location Map - Alternative 2

<u>2.2 Management Objectives</u>. Appropriate management of an ODMDS is aimed at assuring that disposal activities will not unreasonably degrade or endanger human health, welfare, the marine environment, or economic potentialities (MPRSA §103(a)). The primary objectives in the management of the Jacksonville ODMDS are:

- Protection of the marine environment;
- Documentation of disposal activities and compliance; and
- Maintenance of a long term disposal alternative for dredged material generated in the Jacksonville, Florida vicinity

The following sections provide the framework for meeting these objectives to the extent possible.

<u>2.3 Disposal History and Dredged Material Volumes</u>. The Jacksonville ODMDS and vicinity has been used for the ocean disposal of dredged material since 1952. Material disposed prior to 1970 and in the early 1970's was disposed in an area 0.5 nautical miles east of the original Jacksonville ODMDS. In the late 1970's material was disposed south of the original site. The expanded Jacksonville ODMDS (Alternative 1) now encompasses the areas of historical disposal. Table 1 summarizes the history of disposal of material.

Table 1. Historical Volumes of Dredged Material Placed in the Jacksonville ODMDS and Vicinity

Year	Dredged Material Quantity (cy) (paid *in situ* volume)			
	Jacksonville Federal Navigation Channel	Naval Station Mayport (permit)	Jacksonville Shipyards (permit)	Total
1952–1970[1]	4,461,594	3,992,997	0	8,454,591
1971–1980[1]	2,652,407	3,048,844	0	5,701,251
1985[2]	15,800	0	0	15,800
1986[2]	0	0	109,700	109,700
1987[3]	82,200	0	26,500	108,700
1988[2]	210,500	0	0	210,500
1996[3]	0	659,623	0	659,623
1997[3]	0	439,748	0	439,748
2000[3]	0	887,284	0	887,284
2001[4]	0	174,832	0	174,832
2002[3]	0	225,200	0	225,200
2003[3]	560,446	905,328	0	1,465,774
2005[3]	0	59,667	0	59,667
2006[3]	0	888,134	0	888,134
2007[4]	510,000	0	0	510,000
2008[4]	0	635,000	0	635,000
2009	0	0	0	0
2010[4]	0	174,941	0	174,941
2011[4]	0	~1,000,000[5]	0	~1,000,000
Total 1996–2011	**8,492,947**	**11,091,598**	**136,200**	**19,720,745**

[1] Data from Jacksonville ODMDS EIS (USEPA 1983), in USEPA and USACE 2007
[2] Data from the USACE Ocean Disposal Database in USEPA and USACE 2007
[3] Data from the Jacksonville District Dredge Information System (paid *in situ* volumes), in USEPA and USACE 2007
[4] Data from the Jacksonville District Post Disposal Monitoring Reports
[5] Project ongoing, dredged volumes are approximate as of February 2011

Since 1995, Naval Station Mayport has utilized the Jacksonville ODMDS on a biannual basis for the disposal of maintenance dredging material. This material typically consists of silts, soft clays and sand mixtures. The Jacksonville Harbor Federal Navigation Project has used the site for disposal of coarse material not approved for beach placement from the Entrance Channel. It is expected that the Naval Station Mayport will continue to utilize the ODMDS, and the Jacksonville Harbor Federal Navigation Project will also continue to utilize the ODMDS for non-beach compatible material in the entrance channel. As upland disposal alternatives become limited, the volume from the Jacksonville Harbor Federal Navigation Project is expected to increase and additional permitted projects may identify a need for ocean disposal.

Maintenance dredged material volumes from the deepened Naval Station Mayport are expected to average 500,000 cubic yards annually. Maintenance dredged material volumes from the Jacksonville Harbor Navigation Project (Cuts 3 to 42) are expected to average 620,000 cubic yards annually. Future new work projects include potential navigation improvements to Jacksonville Harbor currently under investigation that could result in dredged material disposal requirements of 7.6 million to 31.5 million cubic yards depending on project depth. Over the next ten years, 5.0 to 11.2 million cubic yards of maintenance material and 1.11 to 6.94 million cubic yards of new work material for a total of 7.46 to 14.01 million cubic yards of dredged material are expected to be disposed in the ODMDS.

For both alternatives, the capacity of the expanded Jacksonville ODMDS has been estimated at 65 million cubic yards (EPA, 2012).

2.4 Dredged Material Characteristics.

2.4.1 Previously Placed Materials. The original Jacksonville ODMDS (Zone A) currently contains dredged materials that are extremely variable in composition. Materials placed in the Jacksonville ODMDS have historically consisted of rock, gravel, shell hash, silts, soft clays, and sand mixtures.

2.4.2. Anticipated Materials. Based on evaluation of currently permitted projects it has been determined that between twenty (20) and sixty (60) percent of dredged material to be placed in the ODMDS consists of silt and clay. Additionally, rock material associated with deepening projects is anticipated to constitute a considerable amount of material placed in the ODMDS. Rock disposed at the ODMDS will be managed separately (see Section 2.7). Several currently permitted projects contain silty sand that is near-beach quality as established per the State of Florida, Department of Environmental Protection "Rules and Procedures for Application for Coastal Construction Permits" Chapter 62B-41.007(2) j (referred to as the 'Sand Rule'). Silty sand will be placed within the sand-sharing system, to the maximum extent practical, and following the provisions of the Clean Water Act.

2.4.3 Associated Beach Quality Materials. USACE Beneficial Use of Dredged Material EM 1110-2-5026 requires dredged material be maximized within the coastal system. Dredged materials that qualify for beach or nearshore placement per the FDEP's 'Sand Rule' shall be beneficially placed in such location, to the maximum extent practicable. It is expected that the State of Florida will exercise its authority and responsibility, regarding beach nourishment, to the full extent during any future permitting activities. Beneficial use of beach compatible dredged material for beach nourishment is strongly encouraged and supported by EPA.

2.4.4 Dredge Material Quality Verification. The suitability of dredged material for ocean disposal must be verified by the USACE and agreed to via written concurrence from EPA prior to disposal. Verification will be valid for three years from the most current verification.

Verification process:

1) Case-specific evaluation against the exclusion criteria (40 CFR 227.13(b))
2) Determination of testing requirements for non-excluded material based on the potential of sediment contamination since last verification.
3) When applicable, execute testing and determination of suitability of non-excluded material for ocean disposal.

Verification documentation for suitability will be completed prior to use of the Jacksonville ODMDS. Documentation will be in the form of a MPRSA Section 103 Evaluation. The Evaluation and any testing will follow the procedures outlined in the 1991 EPA/USACE Dredged Material Testing Manual and 2008 Southeast Regional Implementation Manual (SERIM) or the appropriate updated versions. This includes how dredging projects will be subdivided into project segments for sampling and analysis. The MPRSA Section 103 Evaluation will be in the form outlined in Appendix B of the SERIM. Water Quality Compliance determinations will be made using the STFATE (ADDAMS) model and the input parameters provided in Appendix A. Only material determined to be suitable through the verification process by the USACE and EPA, Region 4 will be placed at the Jacksonville ODMDS.

2.5 Time of disposal. At present no restrictions have been determined to be necessary for disposal related to seasonal variations in ocean current or biotic activity. Dredging is typically restricted to the winter months due to sea turtle restrictions. As monitoring results are compiled, should any such restrictions appear necessary, disposal activities will be scheduled so as to avoid adverse impacts. During the winter, precautions necessary to protect whales, as described in the next paragraph, are required. Additionally, if new information indicates that endangered or threatened species are being adversely impacted, restrictions may be incurred.

2.6 Disposal Technique. No specific disposal technique is required for this site. However, in order to protect North Atlantic right whales, disposal vessel (either hopper dredge or tug and scow) speed and operation will be restricted in accordance with the most recent USACE South Atlantic Division Endangered Species Act Section 7 Consultation Regional Biological Opinion for Dredging of Channels and Borrow Areas in the Southeastern United States. In addition, the disposal vessel's captain should be aware of the vessel approach restrictions in 50 CFR §224.103 which at the time of this SMMP prohibits approach within 500 yards of a right whale by vessel, aircraft, or any other means.

2.7 Disposal Location. All disposals will be initiated at least 500 feet (1,000 feet for Alternative 2) within the boundaries of the ODMDS. Disposal will be completed (i.e. doors closed) prior to leaving the ODMDS boundaries. Disposal shall occur in one of the release zones based on sediment type as described below and shown in Figures 2a and b. The zone to be used will be determined at the time of project approval. The zone will be proposed by the USACE and included as part of the MPRSA Section 103 Evaluation (Section 2.4). Zones will be selected to prevent mounding above -25 MLLW. The approximate area of each zone is as follows:

Release Zone	Approximate Area (nmi^2) (Alternative 1)	Approximate Area (nmi^2) (Alternative 2)
Zone A	0.82	0.66
Zone B-1	0.52	0.46
Zone B-2	0.55	0.57
Zone C-1	0.63	0.46
Zone C-2	0.66	0.71
Zone D	0.18	0.16
Zone E-1	0.35	0.59
Zone E-2	0.37	0.31

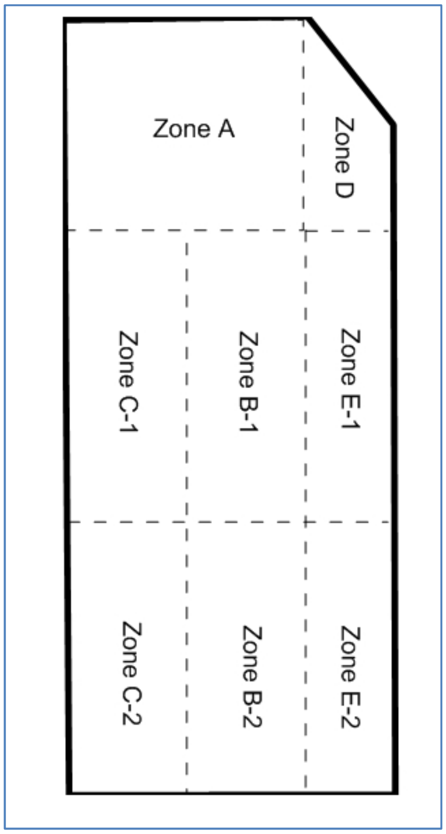


Figure 2(a): Disposal Release Zones (Alternative 1)

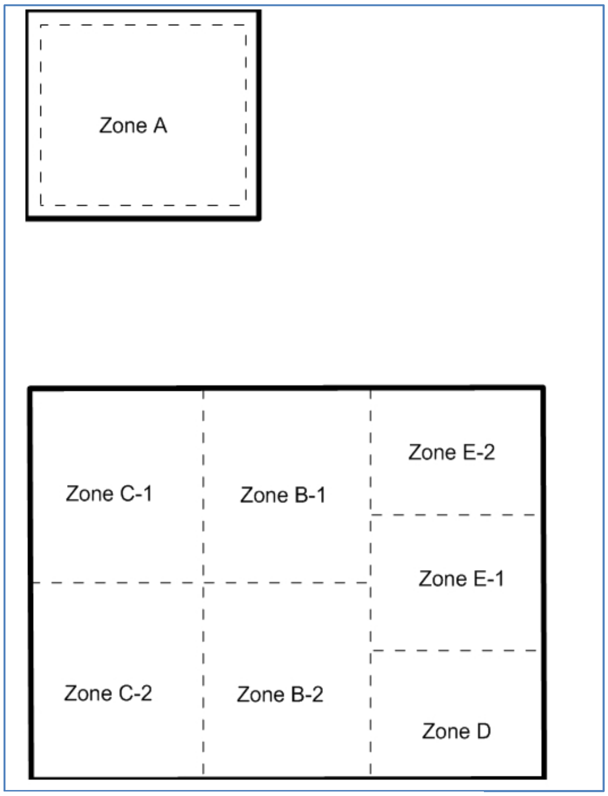


Figure 2(b): Disposal Release Zones (Alternative 2)

<u>2.7.1: Release Zone A – Original ODMDS.</u> Predominately fine-grained material can continue to be disposed within the original ODMDS (Zone A) for projects up to 1 million cubic yards. No more than 1 million cubic yards of material should be authorized for disposal in release Zone A in any one calendar year. Zone A coordinates are as follows:

	Geographic (NAD83)		State Plane (FL East 0901 Ft NAD83)	
Center	30°21.02 'N	81°17.99'W	2187429 N	561603 E
NW Corner	30°21.43 'N	81°18.46'W	2189965 N	559131 E
NE Corner	30°21.43'N	81°17.52'W	2189952 N	564089 E
SW Corner	30°20.60'N	81°18.46'W	2184904 N	559117 E
SE Corner	30°20.60'N	81°17.52 'W	2184891 N	564076 E

Disposal should be initiated within the disposal zone. More specific release zones can be defined within this disposal zone on a per-project basis to better distribute dredged material throughout the area and to avoid shallow areas within the ODMDS.

2.7.2 Release Zone B – Sand. Predominately sand and shell should be disposed in release Zone B. Project specific subzones should be designated for each project with the intent of dispersing the material over a larger area. Zone B-1 should be used until a depth of -30 feet MLLW is reached prior to moving to Zone B-2. The disposal zone coordinates are as follows:

Disposal Zone B-1

	Geographic (NAD83)		State Plane (FL East 0901 Ft NAD83)	
Center	TBD	TBD	TBD	TBD
NW Corner	TBD	TBD	TBD	TBD
NE Corner	TBD	TBD	TBD	TBD
SW Corner	TBD	TBD	TBD	TBD
SE Corner	TBD	TBD	TBD	TBD

Disposal Zone B-2

	Geographic (NAD83)		State Plane (FL East 0901 Ft NAD83)	
Center	TBD	TBD	TBD	TBD
NW Corner	TBD	TBD	TBD	TBD
NE Corner	TBD	TBD	TBD	TBD
SW Corner	TBD	TBD	TBD	TBD
SE Corner	TBD	TBD	TBD	TBD

2.7.3 Release Zone C- Fines. Predominately fine-grained material should be disposed in release Zone C. Project specific subzones should be designated for each project with the intent of disposing in the smallest area possible to minimize the amount of benthic habitat that is affected. Release zones of 0.25 nmi^2 are recommended for most maintenance dredging projects. Zone C-1 should be used until a depth of -30 feet MLLW is reached prior to moving to Zone C-2. The disposal zone coordinates are as follows:

Disposal Zone C-1

	Geographic (NAD83)		State Plane (FL East 0901 Ft NAD83)	
Center	TBD	TBD	TBD	TBD
NW Corner	TBD	TBD	TBD	TBD
NE Corner	TBD	TBD	TBD	TBD
SW Corner	TBD	TBD	TBD	TBD
SE Corner	TBD	TBD	TBD	TBD

Disposal Zone C-2

	Geographic (NAD83)		State Plane (FL East 0901 Ft NAD83)	
Center	TBD	TBD	TBD	TBD
NW Corner	TBD	TBD	TBD	TBD
NE Corner	TBD	TBD	TBD	TBD
SW Corner	TBD	TBD	TBD	TBD
SE Corner	TBD	TBD	TBD	TBD

2.7.4 Release Zone D- Rock. Material consisting predominately of rock or portions of projects consisting of rock should be disposed in release Zone D. This area had previously been identified by the USACE as suitable for supporting rock placement. Project specific subzones shall be designated for each project starting in the northern portion of Zone D. The zones shall be sized to provide approximately 1 meter of relief. A size of 30 acres per 100,000 cubic yard is recommended to provide a relief of 1 meter (based on a void ratio of 0.5). The disposal zone coordinates are as follows:

Disposal Zone D

	Geographic (NAD83)		State Plane (FL East 0901 Ft NAD83)	
Center	TBD	TBD	TBD	TBD
NW Corner	TBD	TBD	TBD	TBD
NE Corner	TBD	TBD	TBD	TBD
SW Corner	TBD	TBD	TBD	TBD
SE Corner	TBD	TBD	TBD	TBD

2.7.5 Release Zone E – Sand or Rock.

Rock: Material consisting of predominantly rock should be disposed in release Zone E-1 after Zone D has been exhausted. Disposal shall occur as described for Zone D.

Sand: Material consisting of predominantly sand and shell should be disposed in release Zone E-2 after Zones B-1 and B-2 have been exhausted.

Should capacity concerns dictate, sand can be disposed in Zone E-1 or rock in Zone E-2.

The disposal zone coordinates are as follows:

Disposal Zone E-1

	Geographic (NAD83)		State Plane (FL East 0901 Ft NAD83)	
Center	TBD	TBD	TBD	TBD
NW Corner	TBD	TBD	TBD	TBD
NE Corner	TBD	TBD	TBD	TBD
SW Corner	TBD	TBD	TBD	TBD
SE Corner	TBD	TBD	TBD	TBD

Disposal Zone E-2

	Geographic (NAD83)		State Plane (FL East 0901 Ft NAD83)	
Center	TBD	TBD	TBD	TBD
NW Corner	TBD	TBD	TBD	TBD
NE Corner	TBD	TBD	TBD	TBD
SW Corner	TBD	TBD	TBD	TBD
SE Corner	TBD	TBD	TBD	TBD

2.8 Permit and Contract Conditions. The disposal monitoring and post-disposal monitoring requirements described under Section 3.0 Site Monitoring will be included with the management requirements described in this section as permit conditions on all MPRSA Section 103 permits and will be incorporated in the contract language for all federal projects. A summary of the management and monitoring requirements to be included is listed in Table 2. Template language that can be used is included in appendices (see Appendix B and C).

Table 2. Summary of Permit and Contract Conditions

Condition	Reference
Dredged Material Suitability and Term of Verification	Jacksonville ODMDS SMMP page 7 Regional Implementation Manual
Disposal Zone	Jacksonville ODMDS SMMP pages 9-12
Right Whale Avoidance	Jacksonville ODMDS SMMP page 7-8 50 CFR 224.103
Pre and Post Bathymetric Surveys	Jacksonville ODMDS SMMP page 14 and 15
Disposal Monitoring	Jacksonville ODMDS SMMP page 14-15
Reporting Requirements	Jacksonville ODMDS SMMP page 23 and 27

2.9 Permit Process. All disposal of dredged material in the ocean, with the exception of Federal Civil Works projects, requires an ocean dumping permit issued by the USACE pursuant to

Section 103 of the MPRSA. A summary of the permitting process can be found at: http://www.epa.gov/region4/water/oceans/Dredged_Material_Permit_Process.htm.

2.10 Information Management of Dredged Material Placement Activities. As discussed in the following sections, a substantial amount of diverse data regarding use of the Jacksonville ODMDS and effects of disposal is required from many sources. If this information is readily available and in a useable format it can be used to answer many questions typically asked about a disposal site:

- What is being dredged?
- How much is being dredged?
- Where did the dredged material come from?
- Where was the dredged material placed?
- Was dredged material dredged correctly? Disposed correctly?
- What will happen to the environment at the disposal site?

In an attempt to streamline data sharing, EPA Region 4 and USACE South Atlantic Division have agreed on an eXtensible Markup Language (XML) standard for sharing of disposal monitoring data (see also Section 3.6). Additional standards will continue to be investigated for sharing of other disposal site related information (e.g. environmental monitoring data, testing data, etc.).

3.0 SITE MONITORING

The MPRSA establishes the need for including a monitoring program as part of the SMMP. Site monitoring is conducted to ensure the environmental integrity of a disposal site and the areas surrounding the site and to verify compliance with the site designation criteria, any special management conditions, and permit requirements. Monitoring programs should be flexible, cost effective, and based on scientifically sound procedures and methods to meet site-specific monitoring needs. The intent of the program is to provide the following:

> (1) Information indicating whether the disposal activities are occurring in compliance with the permit and site restrictions;
> (2) Information indicating the short-term and long-term fate of materials disposed of in the marine environment;
> (3) Information concerning the short-term and long-term environmental impacts of the disposal.

The main purpose of a disposal site monitoring program is to determine whether dredged material site management practices, including disposal operations, at the site need to be changed to avoid significant adverse impacts.

3.1 Baseline Monitoring. Disposal has occurred in the area since 1952. Therefore, no true baseline information has been or can be collected. The results of investigations presented in the

1978 designation EIS (EPA, 1983), the 2010 designation studies (ANAMAR, 2011), and subsequent surveys listed in Table 3 will serve as the main body of data for the monitoring of the impacts associated with the use of the Jacksonville ODMDS.

A bathymetric survey will be conducted by the USACE or site user within three (3) months prior to dredging cycle or project disposal for projects in excess of 50,000 cubic yards. Bathymetric surveys will be used to monitor the disposal mound to ensure a navigation hazard is not produced, to assist in verification of material placement, to monitor bathymetry changes and trends, and to ensure that the site capacity is not exceeded(i.e., the mound does not exceed the site boundaries).

Surveys will conform to the minimum performance standards for Corps of Engineers Hydrographic Surveys for "Other General Surveys & Studies" as described in the USACE Engineering Manual, EM1110-2-1003, *Hydrographic Surveying* dated January 1, 2002 [http://140.194.76.129/publications/eng-manuals/em1110-2-1003/toc.htm]. The number and length of transects required will be sufficient to encompass the impacted area within the release zone and a 500 foot-wide area around it. The surveys will be taken along lines spaced at 500-foot intervals or less. The minimum performance standards from Table 3-1 *Hydrographic Surveying* shall be followed. Horizontal location of the survey lines and depth sounding points will be determined by an automated positioning system utilizing a differential global positioning system. The vertical datum will be referenced to prescribed NOAA Mean Lower Low Water (MLLW) datum. The horizontal datum should be referenced to the local State Plane Coordinate System (SPCS) for that area or in Geographical Coordinates (latitude-longitude). The horizontal reference datum should be the North American Datum of 1983 (NAD 83). No additional pre-disposal monitoring at this site is required.

<u>3.2 Disposal Monitoring</u>. For all disposal activities, an electronic tracking system (ETS) must be utilized. The ETS will provide surveillance of the transportation and disposal of dredged material. The ETS will be maintained and operated to continuously track the horizontal location and draft condition (nearest 0.5 foot) of the disposal vessel (i.e. hopper dredge or disposal scow) from the point of dredging to the disposal site and return to the point of dredging. Data shall be collected at least every 500 feet during travel to and from the ODMDS and every minute or every 200 feet of travel, whichever is smaller, while approaching within 1,000 feet and within the ODMDS. In addition to the continuous tracking data, the following trip information shall be electronically recorded for each disposal cycle:

a. Load Number
b. Disposal Vessel Name and Type (e.g. scow)
c. Tow Vessel Name (if applicable)
d. Captain of Disposal or Tow Vessel
e. Estimated volume of Load
f. Description of Material Disposed
g. Source of Dredged Material
h. Date, Time and Location at Start at Initiation and Completion of Disposal Event

It is expected that disposal monitoring will be conducted utilizing the Dredge Quality Management (DQM) system for Civil Works projects [see http://dqm.usace.army.mil/Specifications/Index.aspx], although other systems are acceptable. Disposal monitoring and ETS data will be reported to EPA Region 4 on a weekly basis utilizing the eXtensible Markup Language (XML) specification and protocol per Section 3.6. EPA Region 4 and the USACE Jacksonville District shall be notified within 24 hours if disposal occurs outside of the ODMDS or specified disposal zone or if excessive leakage occurs.

3.3 Post Discharge Monitoring. As a follow-up to the pre-disposal bathymetric survey, the USACE or other site user will conduct a bathymetric survey within 30 days after disposal project completion. Surveys will not be required for projects less than 50,000 cubic yards. The number and aerial extent of transects required will be the same as in the pre-disposal survey. Bathymetric survey results will be used to ensure that unacceptable mounding is not occurring and to aid in environmental effects monitoring. For disposal of rock in Zone D, a multibeam or sidescan sonar post disposal survey is required.

3.4 Summary of Results of Past Monitoring Surveys. Surveys conducted at the Jacksonville ODMDS are listed in Table 3. Monitoring activities during the 1970's indicated significant mounding occurring at the site and that a small amount of dredged material had been transported to the south, as demonstrated by bathymetric surveys and physical and chemical analyses of sediments. Since re-initiation of disposal activities at the original ODMDS in the 1990s, mounding has increased (see Figure 3). These bathymetric trends indicate that the site is not dispersive and a significant amount of disposed material remains on site. Both the1978 study and the 1995 and 1998 sediment mapping surveys indicated the presence of fine-grained dredged material south of the site boundaries. Predominant currents in the area flow to the southwest in the fall and winter and northeast during spring and summer. Larger waves in the area are predominantly from the east and occur in the winter. It is possible that some southerly transport of dredged material occurs in the fall and winter due to wave induced re-suspension (EPA, 2009). Long-term fate modeling has also indicated a southerly transport of material (USACE, 2010)

Table 3. Surveys Conducted at the Jacksonville ODMDS

Survey Title	Conducted by	Date	Purpose	Conclusion
Environmental Investigation of a Dredge Spoil Disposal Site near Mayport, Florida	Naval Oceanographic Office	1972-1973	Evaluation of environmental effects of disposal of dredged material with elevated levels of metals.	No permanent impairment of the benthic biological community when relative abundance and diversity of benthic macro fauna in the ODMDS are compared to control stations.
Environmental Investigation of a Dredged Material Disposal Site Near Mayport, Florida	Naval Oceanographic Office	1977-1978	Effects (sediment chemistry, bathymetry) of disposal of material from Mayport Harbor.	Significant change in bathymetry (depth decreased from 43 feet to 34 feet), noticed movement of material to the south, and significant difference found in heavy metal concentration in sediments inside the site than outside.
Disposal Site Monitoring at the Jacksonville ODMDS	U.S. EPA	1986	Benthic infaunal survey.	No significant benthic infaunal difference between control and disposal stations.
Jacksonville ODMDS Sidescan Sonar Survey	U.S. EPA Region 4	March, 1995	Look for presence of natural resources and presence of man made obstructions on the bottom.	No natural resources found; significant amounts of man made obstructions in north half of site and to the north of the site.
Areal Mapping of Sediment Chemistry at the Jacksonville ODMDS	U.S. EPA Region 4 and Center for Applied Isotope Studies	March, 1995	Conduct sediment mapping of site to determine location of dredged material and to provide baseline for future surveys.	Two primary areas containing fine-grained sand associated with dredged material were found: one in the east-central sector of the ODMDS and the other along the southernmost portion of the survey area (½ mi south of the site). One area of coarse grained dredged material was found consisting of a defined mound within the ODMDS boundaries.

Table 3 (Continued). Surveys Conducted at the Jacksonville ODMDS

Survey Title	Conducted by	Date	Purpose	Conclusion
Status & Trends Survey of the Jacksonville	U.S. EPA Region 4 and Barry Vittor and Associates	July, 1995	Baseline for future surveys *ODMDS* (Includes assessment of the macroinfaunal communities within and outside of the ODMDS, sediment grain size, sediment chemistry and water quality)	Comparisons of the stations mean densities and mean number of taxa showed that the only significant differences observed are more likely to be related to the grain size distribution differences seen and not related to the presence or absence of disposed dredged material. Benthic community indices showed that all stations were extremely diverse with an equitable distribution of taxa when compared to known infaunal assemblages from the same general coastal region. In general, metal concentrations (especially lead, copper and zinc) were higher within than outside the ODMDS. Concentrations were lower in 1995 than in 1978. Organics, Pesticides, and PCBs were not detected.
Post Disposal Areal Mapping of Sediment Chemistry at the Jacksonville ODMDS	U.S. EPA Region 4 and Center for Applied Isotope Studies	March, 1997	Determine location and any migration of dredged material	General indication of increase in surficial fines especially in the western portion of the site as indicated by slurry densities and aluminum concentrations.
Post Disposal Status & Trends Survey of the Jacksonville ODMDS	EPA Region 4 and Barry Vittor and Associates	June, 1998	Monitor for any adverse effects following re-initiation of site use. (Includes assessment of the macroinfaunal communities within and outside of the ODMDS, sediment grain size, sediment chemistry and water quality)	In general, all stations were extremely diverse with an equitable distribution of taxa relative to other benthic infaunal assemblages in the region. There was no predictable pattern in community indices or biomass between stations within and outside the ODMDS. Copper and zinc concentrations remain elevated within the ODMDS, but to a leaser degree than in 1995. Dissolved oxygen levels throughout the water column were lower (3-5mg/l) in 1998 than in 1995 (6mg/l).
Pre-disposal Bathymetry Survey	USACE-Jacksonville	Sept. 2001	Monitor bathymetric trends	Depth maintained at greater than 35 feet throughout the ODMDS.
Post-disposal Bathymetry Survey	USACE-Jacksonville	Nov. 2001	Monitor bathymetric trends	Depth maintained at greater than 34 feet throughout the ODMDS.

Table 3 (Continued). Surveys Conducted at the Jacksonville ODMDS

Survey Title	Conducted by	Date	Purpose	Conclusion
Pre-disposal Bathymetry Survey	USACE-Jacksonville	Oct. 2002	Monitor bathymetric trends	Depth maintained at greater than 35 feet throughout the ODMDS.
Pre/Post-disposal Bathymetry Survey	USACE-Jacksonville	April 2003	Monitor bathymetric trends	Depth maintained at greater than 34 feet throughout the ODMDS.
Post-disposal Bathymetry Survey	USACE-Jacksonville	Sept. 2004	Monitor bathymetric trends	Accretions of 2 to 8 feet of material within the disposal zone since 2002. No measurable change in depth outside of the ODMDS boundaries. Depth maintained at greater than 32 feet throughout the ODMDS.
Pre/Post-disposal Bathymetry Survey	USACE-Jacksonville	June 2007	Monitor bathymetric trends	Accretions of material to the south of the disposal zone since 2004. No measurable change in depth outside of the ODMDS boundaries. Depth maintained at greater than 32 feet throughout the ODMDS.
Pre-disposal Bathymetry Survey	USACE-Jacksonville	Feb. 2008	Monitor bathymetric trends	Minimum Depth of 30 feet.
Post-disposal Bathymetry Survey	USACE-Jacksonville	July 2008	Monitor bathymetric trends	Minimum Depth of 26 feet.
Trend Assessments Survey of the Jacksonville ODMDS	EPA Region 4	June, 2009	Monitor for any adverse effects.(Includes assessment of the macroinfaunal communities within and outside of the ODMDS, sediment grain size, sediment chemistry and water quality)	Higher taxa richness, diversity and density outside of ODMDS, but not a significant difference between stations inside and outside of the OMDDS. TBT detected in sediments in and to the south of the ODMDS. Other metal concentrations in sediment continue to decrease.
Jacksonville ODMDS Reconnaissance Survey (Sidescan Sonar & Video)	EPA Region 4/USACE-Jacksonville/ANAMAR	October 2009	Determine suitable location for a new ODMDS	Naturally occurring hardbottom occurs to the north of the channel. Scattered rubble fields occur around the existing ODMDS.
Pre-disposal Bathymetry Survey	USACE-Jacksonville	Jan. 2010	Monitor bathymetric trends	Minimum Depth of 30 feet.

Table 3 (Continued). Surveys Conducted at the Jacksonville ODMDS

Survey Title	Conducted by	Date	Purpose	Conclusion
Jacksonville ODMDS Reconnaissance Survey (Sidescan Sonar & Video)	EPA Region 4/USACE-Jacksonville/ANAMAR	March 2010	Determine suitable location for a new ODMDS. Search zone was expanded.	Livebottom consisting of transverse ark reefs were observed in the southeast extension survey area. Potential reef feature east of the ODMDS was confirmed to not exist.
Spring Site Designation Study	EPA Region 4/USACE-Jacksonville/ANAMAR	March 2010	Collect baseline physical, chemical, and biological data on candidate disposal sites.	
Post-disposal Bathymetry Survey	USACE-Jacksonville	April 2010	Monitor bathymetric trends	Minimum Depth of 30 feet.
Fall Site Designation Study	EPA Region 4/USACE-Jacksonville/ANAMAR	September 2010	Collect baseline physical, chemical, and biological data on candidate disposal sites.	
Mid-Project Bathymetry Survey	USACE-Jacksonville	Feb. 2011	Monitor bathymetric trends	Minimum Depth of 29 feet.

Sediment analyses in the late 1970's showed higher concentrations of certain heavy metals (Ni, Cu, Zn, Pb, and Cr), Kjeldahl nitrogen (the sum of organic nitrogen, ammonia, and ammonium), and organic carbon in sediments within the disposal site versus outside the site. This is to be expected as material high in metal concentrations, requiring a waiver of EPA's criteria, was disposed at the ODMDS. Sediment analysis as part of the 1995 benthic survey showed that, in general, metal concentrations within the ODMDS remained elevated compared to outside of the ODMDS. However, concentrations within the ODMDS have decreased since 1978 and, based on the 1998 and 2009 studies, continue to decrease. The average percentage of silts and clays at stations within the ODMDS exceeds that of stations outside the ODMDS, but has decreased both inside and outside of the ODMDS since 1978. Figure 4 shows that metal concentrations within the site increased following significant ODMDS use in 1972 and 1978, but have subsequently decreased.

A benthic infaunal survey was conducted in 1986. Results of the macro infaunal community analysis indicated no difference between disposal and control stations and no difference could be found which could be related to active disposal. A second benthic infaunal survey was conducted in 1995. The sampling stations were composed primarily of sand, with silt/clay content of less than 10%. Station 4, in the center of the disposal pile, had the highest silt/clay fraction, and interestingly also had the highest gravel fraction (21 %). Comparisons of the stations' mean densities and mean number of taxa showed that the only significant differences observed are more likely to be related to the grain size distribution differences seen and not related to the presence or absence of disposed dredged material. Benthic community indices showed that all stations were extremely diverse with an equitable distribution of taxa when compared to known infaunal assemblages from the same general coastal region. Numerical classification of the 12 stations tended to group the stations relative to the coarser grain size fractions. The 1998 study showed that communities remain diverse and no significant changes were observed either temporally or spatially. In 2009, few differences could be found when comparing the various study parameters between stations located inside and outside the ODMDS. Metal concentrations continue to decrease both inside and outside of the ODMDS. Tributyl tin detected within and to the south of the ODMDS boundaries was likely the result of dredged material disposal. Although there was higher taxa richness, diversity, and density outside the ODMDS, there was not a significant difference between stations outside and inside the ODMDS boundaries (EPA, 2010).

A sidescan survey was conducted in March 1995. Results of the survey showed that the site and the area north of the site are cluttered with various types of debris and artificial reef material. This is consistent with historical uses of the area. Although not designated as such, this site has historically been used as a disposal location in rough weather for artificial reef material destined for artificial reefs further offshore. Subsequent reconnaissance by divers identified biological resources near the center of the site. Based on visual observations these resources are associated with past disposal of construction material. As part of the designation surveys for the expanded ODMDS, sidescan sonar surveys indicated scattered rubble throughout the site proximal to the original ODMDS (ANAMAR, 2010). The 2012 Draft EIS documents the locations of the rubble areas (EPA, 2012).

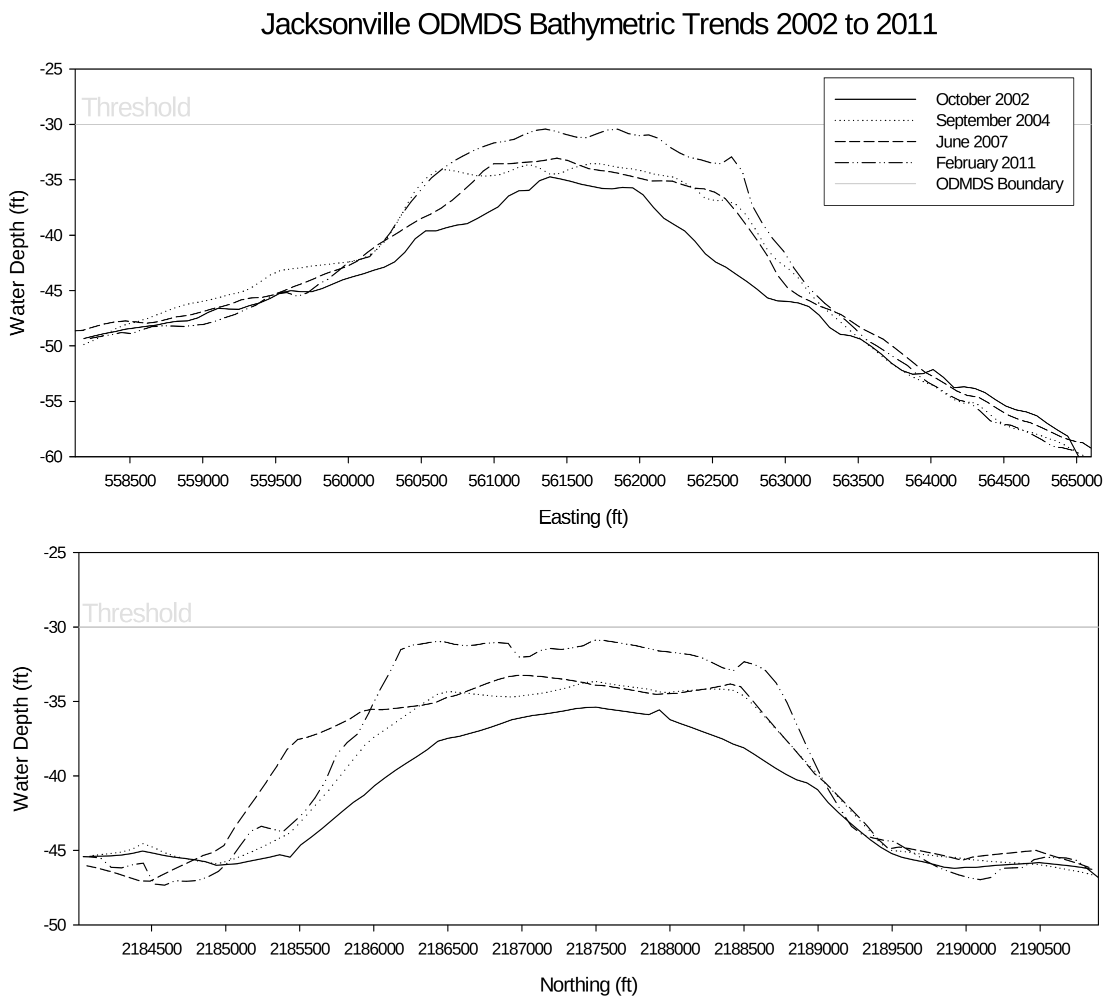


Figure 3: Bathymetric Trends at the Existing Jacksonville ODMDS (Zone A)

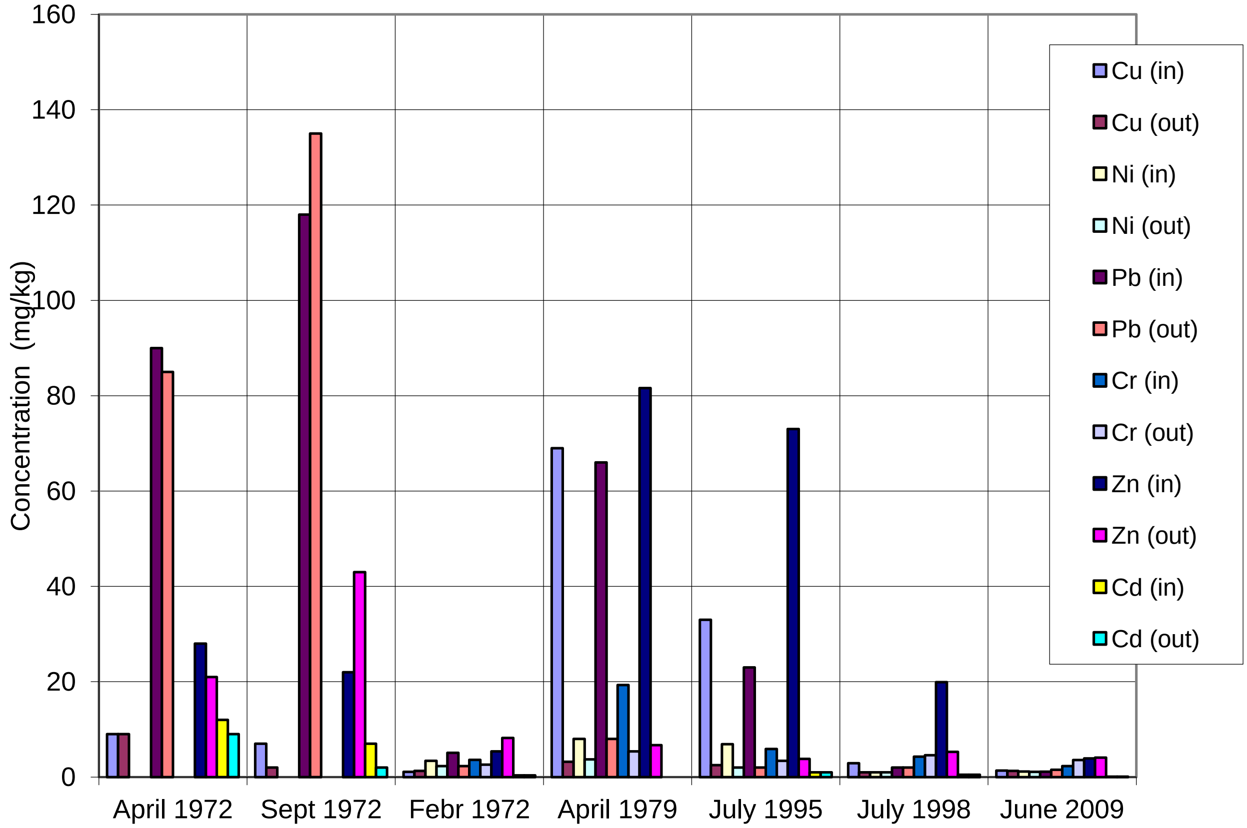


Figure 4. Existing Jacksonville ODMDS (Zone A) Sediment Chemistry Trends.

Note: (in) represents stations within the ODMDS and (out) represents stations outside of the ODMDS.

3.5 Future Monitoring Surveys. Based on the type and volume of material disposed and impacts of concern, various monitoring surveys can be used to determine if and where the disposed material is moving and what environmental effect the material is having on the site and adjacent areas.

Nearshore shrimping grounds are located between the site and the coastline and both natural and artificial reefs are common on the mid-shelf east of the site. A sand borrow area is located east of Alternative 1 and northeast of Alternative 2. Monitoring results indicate that the disposal mound is relatively stable with possible southerly transport of material so these areas are not of concern. Sediment composition within the site may be altered as a result of disposal of clay and silty material on otherwise sandy sediments. Progressive transition to sediments containing a higher percentage of silt and clay is inevitable with continued use of the site. Changes in sediment composition will likely alter the benthic community structure. However, based on previous benthic studies, it is unlikely that permanent or long-term adverse impacts will result due to changes in sediment composition. Due to the concern that disposal of silts and clay could contaminate nearby sand borrow areas with fine grain material making the area unsuitable as a sand source, the site will be managed using the prescribed release zones. Additionally, the release zones where rock will be disposed along the eastern border will be managed with the knowledge that valuable habitat may develop.

A summary of the monitoring strategies for the Jacksonville ODMDS and thresholds for management actions are presented in Table 4. The ODMDS will be monitored for transport of material offsite, especially towards the borrow areas. Additionally, any habitat created from rock disposal will be monitored to assess its functional benefit.

Should future disposal at the Jacksonville ODMDS result in unacceptable adverse impacts as documented in trend assessment surveys, further studies may be required to determine the persistence of these impacts, the extent of the impacts within the marine system, and/or possible means of mitigation. In addition, the management plan presented may require revision based on the outcome of any monitoring program.

3.6 Reporting and Data Formatting.

3.6.1 Project Initiation and Violation Reporting. The USACE or other site user shall notify EPA 15 days prior to the beginning of a dredging cycle or project disposal. The user is also required to notify the USACE and the EPA within 24 hours if a violation of the permit and/or contract conditions related to MPRSA Section 103 or SMMP requirements occur during disposal operations.

3.6.2 Disposal Monitoring Data. Disposal monitoring data shall be provided to EPA Region 4 electronically on a weekly basis. Data shall be provided per the EPA Region 4 XML format and delivered as an attachment to an email to DisposalData.R4@epa.gov. The XML format is available from EPA Region 4.

Table 4. Jacksonville ODMDS Monitoring Strategies and Thresholds for Action

Goal	Technique	Sponsor	Rationale	Frequency	Threshold for Action	Management Options	
						Threshold Not Exceeded	Threshold Exceeded
Short & Long-term Fate of Disposed Dredged Material	Sediment Profile Imaging	Site User /EPA	Confirm aerial extent of disposal mound (apron) and benthic impact. Confirm not impacting benthic communities outside of the ODMDS	Following major New Work Project	Disposal mound footprint occurs outside ODMDS boundaries (5cm)	Continue to use site without further restrictions	-Restrict disposal volumes -Modify disposal zones -Institute Environmental Effects Monitoring
Monitor Bathymetric Trends	Bathymetry	Site User	Determine the extent of the disposal mound and major bathymetric changes	Pre and post disposal for significant projects (>50,000cy)	Disposal mound occurs outside ODMDS boundaries	Continue Monitoring	-Modify disposal method/placement -Restrict Disposal Volumes
Ensure Safe Navigation Depth	Bathymetry	Site User	Determine height of mound and any excessive mounding	Post disposal for significant projects (>50,000cy)	Mound height > -30 feet MLLW	Continue Monitoring	-Modify disposal method/placement -Direct disposal operators to avoid areas shallower than 30 feet.
					Mound height > -25 feet MLLW	Continue Monitoring	-Physically level material shallower than 25 feet -Notify mariners of mound location and depth -Further restrict disposal volumes.

Table 4 (Continued). Jacksonville ODMDS Monitoring Strategies and Thresholds for Action

Goal	Technique	Sponsor	Rationale	Frequency	Threshold for Action	Management Options	
						Threshold Not Exceeded	Threshold Exceeded
Trend Assessment	Water and Sediment Quality, Benthic Community Analysis (40CFR228.13)	U.S. EPA	Periodically evaluate the impact of disposal on the marine environment (40CFR 228.9)	Approximately every 10 years.	-Absence from the site of pollution sensitive biota -Progressive non-seasonal changes in water or sediment quality	Continue Monitoring	-Conduct Environmental Effects Monitoring or Advanced Environmental Effects Monitoring -Review dredged material evaluation procedures
Environmental Effects Monitoring	Chemical Monitoring	EPA/ USACE	Determine if chemical contaminants are significantly elevated[1] within and outside of site boundaries	Implement if disposal footprint extends beyond the site boundaries or if Trend Assessment results warrant.	Contaminants are found to be elevated[1]	Discontinue monitoring.	- Institute Advanced Environmental Effects Monitoring - Implement case specific management options (ie. Remediation, limits on quantities or types of material). -Consider isolating dredged material (capping)
	Benthic Monitoring	EPA/ USACE	Determine whether there are adverse changes in the benthic populations outside of the site and evaluate recovery rates		Adverse changes observed outside of the site that may endanger the marine environment		

[1] Significantly elevated: Concentrations above the range of contaminant levels in dredged sediments that the Regional Administrator and the District Engineer found to be suitable for disposal at the ODMDS.
[2] Examples of sub-lethal effects include without limitation the development of lesions, tumors, development abnormality, and/or decreased fecundity.

Table 4 (Continued). Jacksonville ODMDS Monitoring Strategies and Thresholds for Action

Goal	Technique	Sponsor	Rationale	Frequency	Threshold for Action	Management Options	
						Threshold Not Exceeded	Threshold Exceeded
Advanced Environmental Effects Monitoring	Tissue Chemical Analysis	EPA/ USACE	Determine if the site is a source of adverse bioaccumulation which may endanger the marine environment	Implement if Environmental Effects Monitoring warrants.	Benthic body burdens and risk assessment models indicate potential for food chain impacts.	Discontinue monitoring	-Discontinue site use - Implement case specific management options (i.e. Remediation, limits on quantities or types of material).
	Benthic Monitoring		Determine if the site is a source of adverse sub-lethal[2] changes in benthic organisms which may endanger the marine environment		Sub-lethal effects are unacceptable.		
Document Habitat Creation	Multibeam bathymetry or sidescan sonar	Site User	Determine the relief and aerial extent of habitat created.	Post disposal	Less than 0.5 meters of relief created	Continue Monitoring	Decrease size of release zone
Protect Sand Borrow Areas	Sediment Profile Imaging	EPA/USACE	Ensure no adverse impacts on mineral extraction (40 CFR 228.6(a)(8))	Every 10 years	Dredged material detected greater than 1 cm outside of the ODMDS	Continue Monitoring	- Adjust disposal zones - Construct underwater sand berms
Compliance	Disposal Site Use Records in EPA Region 4's XML format	Site User	-Ensure management requirements are being met -To assist in site monitoring	Daily during the project	Disposal records required by SMMP are not submitted or are incomplete	Continue Monitoring	-Restrict site use until requirements are met

3.6.3 Post Disposal Summary Reports. A Post Disposal Summary Report shall be provided to EPA within 90 days after project completion. These reports should include: dredging project title; permit number and expiration date (if applicable); contract number; name of contractor(s) conducting the work, name and type of vessel(s) disposing material in the ODMDS; disposal timeframes for each vessel; volume disposed at the ODMDS (as paid *in situ* volume, total paid and un paid *in situ* volume, and gross volume reported by dredging contractor); number of loads to ODMDS; type of material disposed at the ODMDS; identification by load number of any misplaced material; dates of pre and post disposal bathymetric surveys of the ODMDS; and a narrative discussing any violation(s) of the 103 concurrency and/or permit (if applicable). The narrative should include a description of the violation, indicate the time it occurred and when it was reported to the EPA and USACE, discuss the circumstances surrounding the violation, and identify specific measures taken to prevent reoccurrence. The Post Disposal Summary Report should be accompanied by the bathymetry survey results (plot and X,Y,Z ASCII data file), a summary scatter plot of all disposal start locations, and a summary table of the trip information required by Section 3.2 with the exception of the disposal completion data. If all data is provided in the required XML format, scatter plots and summary tables will not be necessary.

3.6.4 Environmental Monitoring. Material tracking, disposal effects monitoring, and any other data collected shall be coordinated with and be provided to SMMP team members and federal and state agencies as appropriate. Data will be provided to other interested parties requesting such data to the extent possible. Data will be provided for all surveys in a report generated by the action agency.

The report should indicate:

1) How the survey relates to the SMMP and previous surveys at the Jacksonville ODMDS
2) Provide data interpretations, conclusions, and recommendations
3) Project the next phase of the SMMP

Monitoring results will be summarized in subsequent revisions to the SMMP.

4.0 MODIFICATION OF THE JACKSONVILLE ODMDS SMMP

Should the results of the monitoring surveys or reports from other sources indicate that continued use of the ODMDS would lead to unacceptable effects; the ODMDS SMMP will be modified to mitigate the adverse impacts. The SMMP will be reviewed and revised at a minimum of every ten years. The SMMP will be reviewed and updated as necessary if site use changes significantly. For example, the SMMP will be reviewed if the quantity or type of dredged material placed at the site changes significantly or if conditions at the site indicate a need for revision.

5.0 REFERENCES

ANAMAR, 2010a. *Final Report Jacksonville ODMDS Reconnaissance Sidescan Sonar Survey*. Prepared for U.S. Army Corps of Engineers Jacksonville District. Contract Number W912EP-09-C-0058. March 2010.

ANAMAR, 2010b. *Addendum to Final Report Jacksonville ODMDS Reconnaissance Sidescan Sonar Survey*. Prepared for U.S. Army Corps of Engineers Jacksonville District. Contract Number W912EP-09-C-0058. August 2010.

ANAMAR, 2011. *Final Report Site Designation Studies for a New Ocean Dredged Material Disposal Site off Jacksonville, Florida: Spring and Fall 2010 Survey Results*. Prepared for U.S. Army Corps of Engineers Jacksonville District. Contract Number W912EP-09-C-0058. April 2011.

Fredette, Thomas J., Nelson, David A., Clausner, James E., and Anders, Fred J. 1990. *Guidelines for Physical and Biological Monitoring of Aquatic Dredged Material Disposal Sites*, Technical Report D-90-12, US Army Engineer Waterways Experiment Station, Vicksburg, MS.

Pequegnat, Willis E., Gallaway, Benny J., and Wright, Thomas D., 1990. *Revised Procedural Guide for Designation Surveys of Ocean Dredged Material Disposal Sites*, Technical Report D-90-8, US Army Engineer Waterways Experiment Station, Vicksburg, MS.

Little, Brenda J., C.S. Gordon, and D.K. Young. 1977. *Environmental Investigation of a Dredged Material Disposal Site Near Mayport, Florida -- First Interim Report*. Oceanography Division, Naval Oceanographic Laboratory, Naval Ocean Research and Development Activity, NSTL Station, MS.

Little, Brenda J., and Young, David K., 1978. *Environmental Investigation of a Dredged Material Disposal Site Near Mayport, Florida -- Final Report*. Oceanography Division, Naval Oceanographic Laboratory, Naval Ocean Research and Development Activity, NSTL Station, MS.

U.S. Army Corps of Engineers (USACE). 2008. *Jacksonville ODMDS Capacity Report.* USACE Jacksonville District. May 2008.

U.S. Army Corps of Engineers (USACE). 2010. *LTFATE Modeling at the Jacksonville ODMDS.* USACE Jacksonville District. June 2010.

U.S. Department of the Navy. 1996. *Draft Programmatic Environmental Impact Statement to Evaluate Facilities Development Necessary to Support Potential Aircraft Carrier*

Homeporting at Naval Station Mayport, Florida, March 1996. Department of the Navy Southern Division, Naval Facilities Engineering Command, Charleston, South Carolina.

U.S. Environmental Protection Agency (EPA). 1983. *Environmental Impact Statement (EIS) for Jacksonville Harbor, Florida Ocean Dredged Material Disposal Site Designation,* February 1983.

U.S. Environmental Protection Agency (EPA). 1987. *Benthic Community Characterization Study at the Jacksonville, Florida, ODMDS During April 1986*, May 27, 1987. Prepared by Barry A. Vittor & Associates, Inc. under contract to Battelle Ocean Sciences for U.S. EPA, Office of Marine and Estuarine Protection.

U.S. Environmental Protection Agency (EPA). 1996. *Postdisposal Areal Mapping of Sediment Chemistry at the Jacksonville, Florida ODMDS*, April 8, 1996. Prepared by Center for Applied Isotope Studies under contract to Battelle Ocean Sciences for U.S. EPA, Office of Wetlands, Oceans and Watersheds.

U.S. Environmental Protection Agency (EPA). 1996. *Jacksonville, Florida ODMDS Benthic Community Assessment,* October 1996. Prepared by Barry A. Vittor & Associates, Inc. for US Army Corps of Engineers Waterways Experiment Station Coastal Ecology Branch under an interagency agreement with Environmental Protection Agency Region 4.

U.S. Environmental Protection Agency (EPA). 1997. *Postdisposal Areal Mapping of Sediment Chemistry at the Jacksonville, Florida ODMDS,* October, 1997. Prepared by Center for Applied Isotope Studies prepared for U.S. EPA Region 4, Wetlands, Coastal and Water Quality Branch. (Purchase Order No. 7R-0459-NAEX)

U.S. Environmental Protection Agency (EPA). 1999. *Jacksonville, Florida ODMDS 1998 Benthic Community Assessment,* November 1999. Prepared by Barry A. Vittor & Associates, Inc. for for U.S. EPA Region 4, Wetlands, Coastal and Water Quality Branch.

U.S. Environmental Protection Agency (EPA). 1999. *Jacksonville, Florida Ocean Dredged Material Disposal Site Benthic Surveys: 1995 and 1998*, December 1999. U.S. EPA Region 4, Science and Ecosystem Support Division.

U.S. Environmental Protection Agency (EPA). 2009. *Ocean Current and Wave Measurements at the Jacksonville and Fernandina Beach Ocean Dredged Material Disposal Sites*, January 2009. EPA-904-R-09-00.1 U.S. EPA Region 4.

U.S. Environmental Protection Agency (EPA). 2010. *Jacksonville, Florida Ocean Dredged Material Disposal Site Survey*. June 18-19, 2009. U.S. EPA Region 4, Science and Ecosystem Support Division.

U.S. Environmental Protection Agency (EPA). 2012. *Draft EIS for Designation of an Ocean Dredged Material Disposal Site Offshore Jacksonville, Florida*. March 2012

U.S. Environmental Protection Agency and U.S. Army Corps of Engineers, 1991. *Evaluation of Dredged Material Proposed for Ocean Disposal (Testing Manual)*, February 1991. Prepared by Environmental Protection Agency Office of Marine and Estuarine Protection and Department of Army United States Army Corps of Engineers under EPA Contract No. 68-C8-0105.

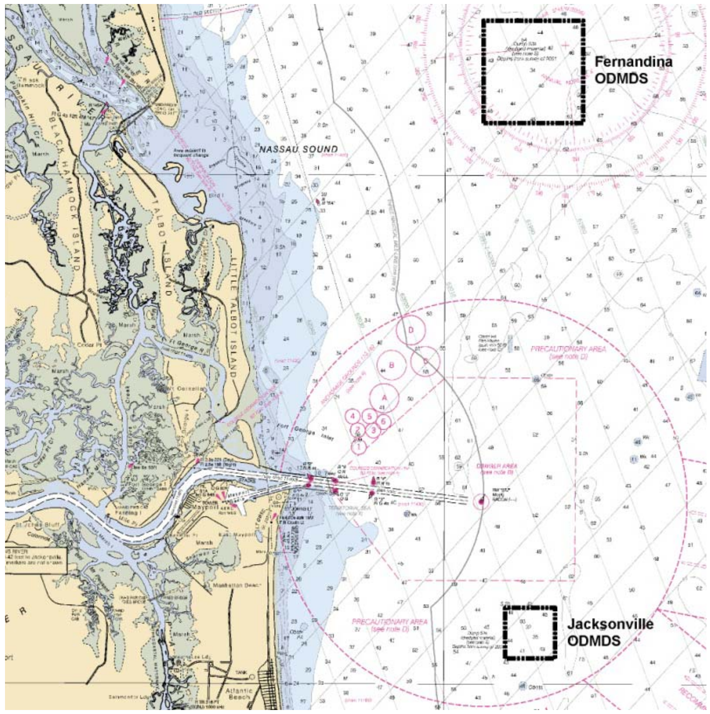
U.S. Environmental Protection Agency and U.S. Army Corps of Engineers, 1996. *Guidance Document for Development of Site Management Plans for Ocean Dredged Material Disposal Sites*, February 1996. Prepared by Environmental Protection Agency Office of Water and Department of Army United States Army Corps of Engineers.

U.S. Environmental Protection Agency Region 4 and U.S. Army Corps of Engineers South Atlantic Division, 1993. *Regional Implementation Manual Requirements and Procedures for Evaluation of the Ocean Disposal of Dredged Material in Southeastern Atlantic and Gulf Coastal Waters*, May 1993.

U.S. Naval Oceanographic Office. 1973. *Environmental Investigation of a Dredge Spoil Disposal Site Near Mayport, Florida*, NAVOCEANO Technical Note No. 6110-4-73. Physical Oceanography Division, Department of the Navy, Washington, D.C..

APPENDIX G

Zone of Siting Feasibility Study



Draft Environmental Impact Statement
for
Designation of an Ocean Dredged Material Disposal Site Offshore of Jacksonville, Florida

EPA
United States
Environmental Protection
Agency

U.S. EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303

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ZONE OF SITING FEASIBILITY STUDY

For

The Environmental Protection Agency (EPA)

Expansion/Designation of the Jacksonville Harbor Ocean Dredged Material Disposal Site (ODMDS)

May 21, 2010

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INTRODUCTION

On April 30, 2007, a Memorandum of Understanding (MOU) was signed between the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA) Region 4 on ocean dredged material disposal. The MOU is intended to facilitate the implementation of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended (MPRSA), 33 U.S.C. Sections 1411-1421, with respect to ocean dredged material disposal and to establish the basis for cooperative efforts between EPA Region 4 and USACE South Atlantic Division (SAD), consistent with statutory and regulatory authority and responsibility.

One of the interrelated activities for which EPA and/or USACE have responsibilities is the designation or selection of ocean dredged material disposal sites (ODMDS). Under Section 102 of the MPRSA, EPA is authorized to designate sites and time periods for dumping. USACE has determined the need for either designation of a new ODMDS or a modification to the existing ODMDS offshore of Jacksonville, Florida, and, as required by the MOU, is providing a Zone of Siting Feasibility (ZSF) study including economic and logistical factors used in the formulation of the zone.

Based on available preliminary cost-benefit information and assumptions for O&M maintenance quantities, the ZSF analysis indicates a distance of five miles offshore provides a benefit-to-cost (B/C) ratio greater than one, but distances of ten or fifteen miles offshore result in a B/C ratio of less than one. Using preliminary new construction costs and benefits, a distance of about five to ten miles offshore appears justified. With the addition of new construction quantities, costs, and benefits to the O&M maintenance material costs over a 50-year planning horizon, distances of five, ten, and fifteen miles offshore have a B/C ratio less than one.

BACKGROUND

The existing Jacksonville ODMDS is located approximately 5 nautical miles (nm) southeast of the mouth of the St. Johns River on the continental shelf off the east coast of Florida. It is currently 1 nm by 1 nm (1 nm^2) in size with depths in the release zone area that range from 30 to 55 feet based on a 12 -14 Feb 2010 hydrographic survey. The Site Management and Monitoring Plan (SMMP) requires measures to be taken when depths mound to 30 feet, warning that disposal cutoff depth in that area is imminent. The U.S. Naval Station Mayport is planning to dredge their turning basin and access channels resulting in an estimated 6,240,000 cubic yards. This dredging and disposal will result in the capping of the existing Jacksonville Harbor ODMDS which only has capacity for 2,000,000 cubic yards, the remaining 4,240,000 cubic yards from the Mayport dredging is planned to be disposed of in the Fernandina Harbor ODMDS, a site just north of the St. Johns River Channel entrance, **Figure 1**.

Due to potential capacity issues at this site, USACE Jacksonville District and EPA Region 4 have identified a need to either expand the existing Jacksonville ODMDS or designate a new ODMDS in the vicinity. The need for expanding the current ocean disposal capacity is based on observed mounding, future capacity modeling, historical dredging volumes**,** and estimates of future proposed projects. Supporting documentation that demonstrates the need for expansion and/or new site designations include:

USACE. 2008. *Jacksonville Ocean Dredged Material Disposal Site Capacity Report.* Draft Report. May 2008.

USEPA and USACE. 2007. *Jacksonville Ocean Dredged Material Disposal Site, Site Management and Monitoring Plan.* USEPA and USACE Jacksonville District. November 2007.

Naval Facilities Engineering Command, Southeast (NAVFAC). 2008. *Final Environmental Impact Statement for the Proposed Homeporting of Additional Surface Ships at Naval Station Mayport, Florida + Technical Appendices.* November 2008.

USACE Preliminary Cost Estimate dated 03-26-09 for Jacksonville Harbor GRR-2 Plan Alternative for a 50-foot project depth from the Entrance Channel Bar Cut-3, Station 0+00 through Terminal Channel Station 184+42.8

USACE. 2002. *Navigation Study for Jacksonville Harbor Final General Reevaluation Report and Environmental Assessment.* October 2002.

St. Johns Bar Pilot Association Letter. Subject: Jacksonville Harbor Two-foot Vessel Draft Restriction due to Terminal Channel Shoaling. February 11, 2010.

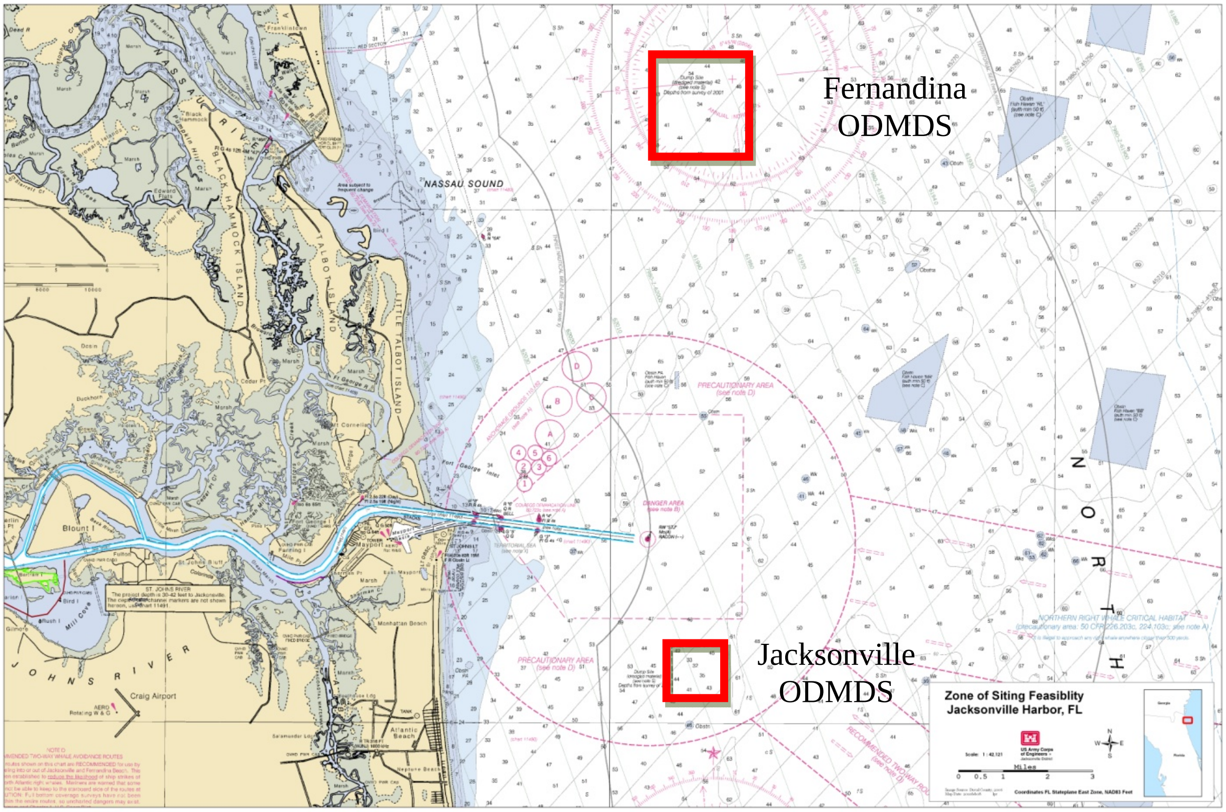


Figure 1: Existing Jacksonville and Fernandina Ocean Dredged Material Disposal Sites

For the designation of a new ODMDS, the site must fulfill certain basic criteria to be considered feasible for use by USACE. The site must be economically and operationally feasible and not pose unacceptable adverse impacts to the marine environment and valued resources. The designation process uses a hierarchical framework that initially defines a zone of economic and operational feasibility within which study areas for disposal sites may be evaluated. Within the ZSF, historically used disposal sites and sensitive and incompatible use areas are identified from existing information sources (USEPA/USACE 1984). Sensitive areas may include marine sanctuaries, breeding, spawning, nursery, feeding, or passage areas of living resources and significant natural or cultural features of historical importance. Incompatible use areas may include shipping lanes, mineral extraction sites, or geographically-limited fisheries or shellfisheries (USEPA 1986). Study areas are evaluated further based on site-specific information and other considerations such as disposal management requirements (USEPA/USACE 1984). Based on results from study area surveys, a preferred alternative and alternative candidate sites are selected for more detailed characterization and inclusion in the EIS.

The EPA and USACE joint document titled *General Approach to Designation Studies for Ocean Dredged Material Disposal Sites* (May 1984) provides the following guidance:

"A site to be designated for the ocean disposal of dredged material must be located within an economically and operationally feasible radius from the point of dredging. This is called the Zone of Siting Feasibility (ZSF). The delineation of the ZSF in selecting a disposal site is dictated by several factors. Important among these are:

- Cost of transporting dredged material to the disposal site and costs of the navigation project
- Type of dredging and disposal plant
- Navigation restrictions
- Political boundaries
- Distance to the edge of the continental shelf
- Feasibility of monitoring and surveillance"

The ZSF delineates the outer geographical boundaries of operational and economic acceptability within which further environmental, regulatory, and socioeconomic analysis is performed to achieve a site designation.

Changed conditions in Jacksonville Harbor since development of the June 2005 Interim Dredged Material Management Plan have resulted in the need for access to an expanded ODMDS by 2012. Initial estimates of shoaling material from berthing areas have increased from 150,000 to about 450,000 cubic yards, **Figures 2** and **3**, with the addition of a new MOL/Trapac container ship terminal west of the Dames Point Bridge and a future Hanjin container ship terminal planned to replace the existing interim cruise ship terminal along the Brills Cut Range of Jacksonville Harbor. Keystone Coal plans to build a bulk terminal near the south end of the Chaseville Turn reach of the Federal channel which will also increase berthing area dredging quantities.

Shoaling Quantities

CHANNEL REACH	ANNUAL SHOALING RATE	DREDGING FREQUENCY	QUANTITY
BARCUT 3 - CUT 13	175,000	3 YEARS	525,000 CY
CUT 14 - CUT 41	80,000	3 YEARS	240,000 CY
CUT 42	330,000	2 YEARS	660,000 CY
CUT 43 - Terminal Channel*	142,000	3 YEARS	426,000 CY
BLOUNT ISLAND - CUTS F&G**	100,000	2 YEARS	200,000 CY
SPONSOR MATERIAL	150,000	1 YEARS	150,000 CY
Totals	977,000		

* Current estimated quantity is 85,000 cy. Additional quantity of 57,000 cy estimated as a result of Phase III construction.

** Cuts F&G are scheduled to be dredged in late 2004 to remove approximately 121,000 cy. Also, JAXPORT (Frank Jones) said that the adjacent berths have experienced a shoaling rate of about 40,000 cy. annually. For purposes of the DMMP, assume annual shoaling of 100,000 cy. and a 2 year frequency.

Figure 2: Shoaling Estimates from 2005

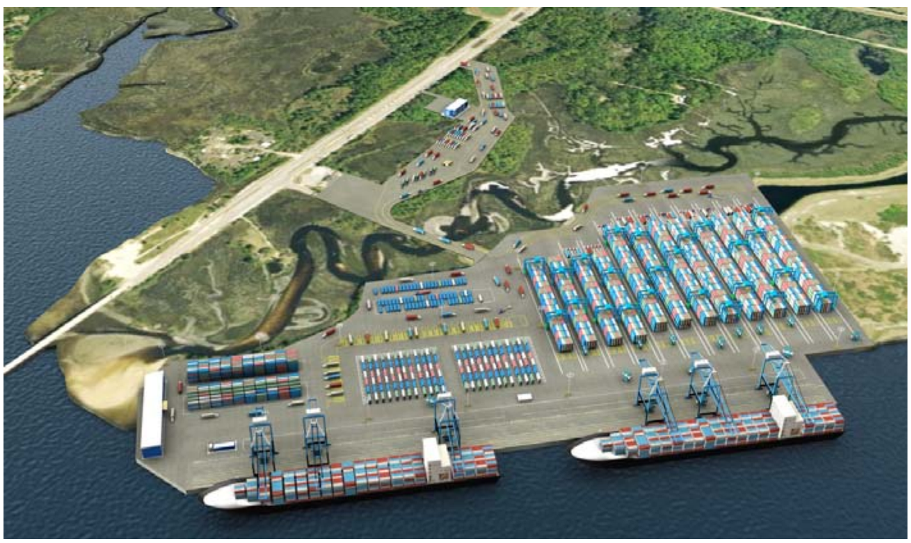


Figure 3: Conceptual layout of the New Hanjin Terminal west of Dames Point Bridge

Changed management practices of existing confined upland disposal facilities have also resulted in a temporary pause in the recycling of dredged material from Buck Island. Potential navigation improvements to Jacksonville Harbor currently under investigation will result in additional dredged material placement requirements that could range from about 6.5 to 38.2 Million cubic yards of material. Also, as previously mentioned, the deepening of U.S. Naval Station Mayport will require 2,000,000 cubic yards in Fiscal Year 2011. During 2004 to 2005, several hurricanes crossed the St. Johns River watershed resulting in increased river flows, which increased shoaling amounts.

Jacksonville Port Authority (JPA) temporarily suspended mining of construction grade material from the Confined Disposal Facility (CDF) at Buck Island in 2008. Based on past discussions with JPA, our 2005 DMMP indicated annual removal of 291,600 cubic yards of material from Buck Island would continue from 2005 through 2026. In addition JPA indicates an additional 450,000 cubic yards/year from terminal berthing areas will have to go to Buck or Bartram Islands in lieu of the 150,000 cubic yards of shoaling material estimated in 2005. Placement of that amount in Buck Island would exhaust its capacity limits by 2011. Additional environmental constraints have prevented the raising of Buck Island dikes to provide more capacity, **Figures 4** and **5**.

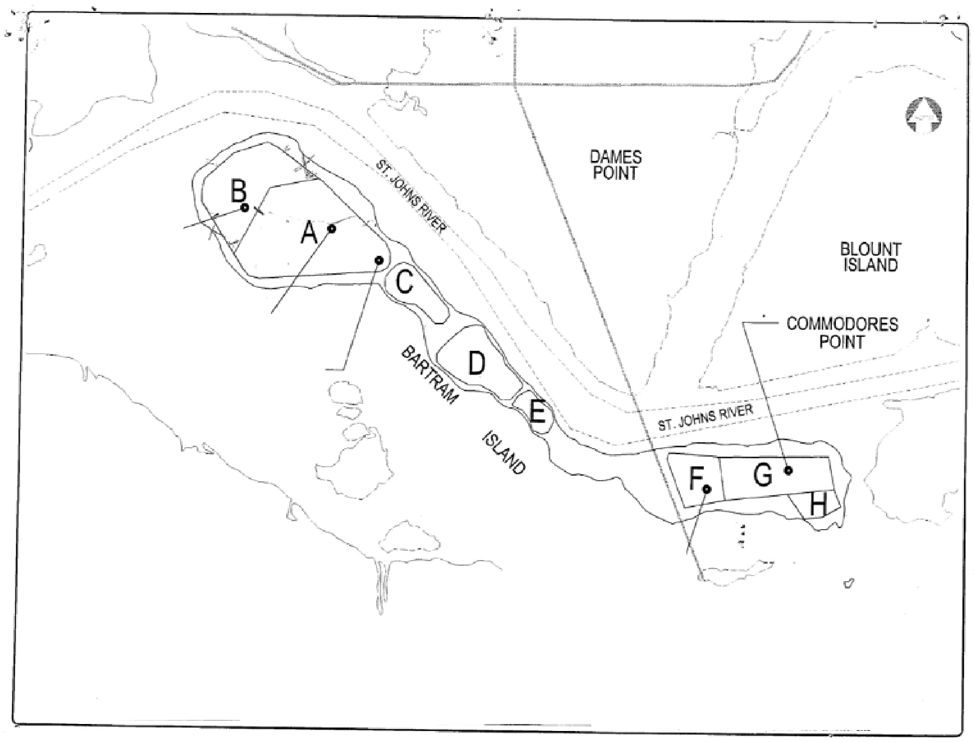


Figure 4: Bartram Island Upland Disposal Site Map

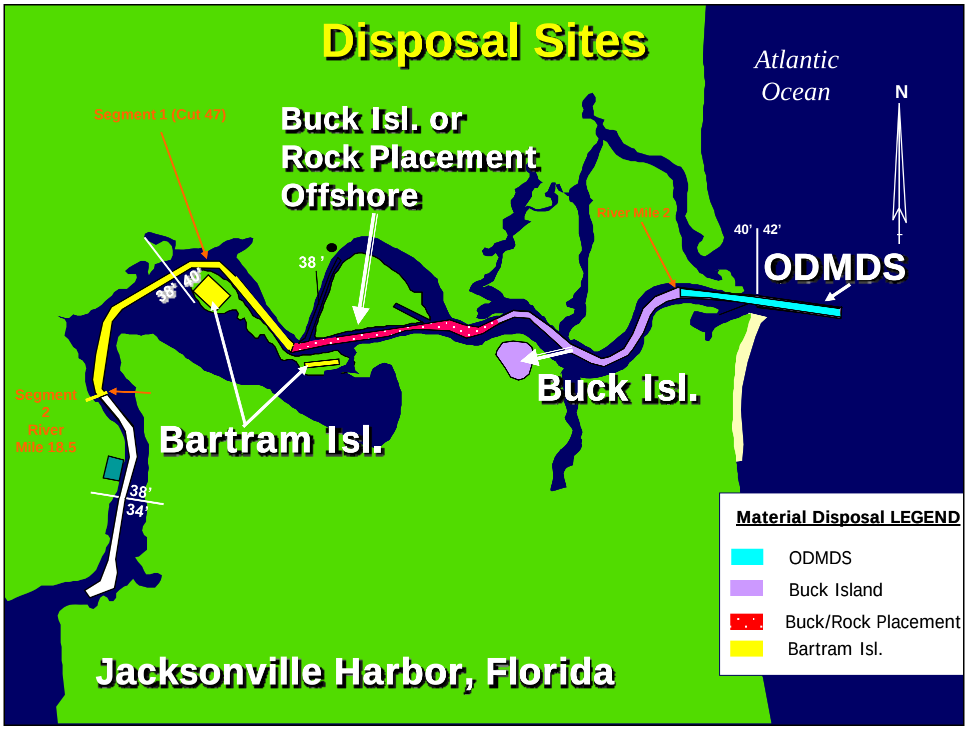


Figure 5: Dredge Material Placement Sites as a function of Channel Cut Location

Planned additional raising of the dikes on Bartram Island CDF Cells B, F, and G has not occurred due to recent geotechnical investigations which identified soil stability problems with the existing material in those cells, **Figure 4**. Continued placement of shoaled berthing area material with high silt content in those cells makes the problem worse. Cell A has enough capacity to handle the quantities from the new construction dredging of the Federal channel from river miles 14.7 to 20 to a project depth of 40 feet currently under construction in May 2010 (contract awarded 5 Jun 09 with expected completion in September 2010), but completion of that activity will nearly fill Cell A. Cell B has restrictions on it now which limit material placement to a 25-foot elevation and since the dikes cannot be raised has almost no future capacity. Rehabilitation of the Cell B dikes to remove the restriction will not occur until Fiscal Year 2012. After completion of the rehabilitation process Cell B will only have a remaining capacity of 0.5 million cubic yards. As an emergency measure the District plans to remove material from Cell F to Cell G to provide capacity for Cell F in an effort to meet shoaling removal requirements for the rest of 2009 and maybe part of 2010. By the end of 2010, however Bartram Island will reach existing capacity limits.

No other upland CDFs currently exist for Jacksonville Harbor. The new Jacksonville Harbor GRR-2 Navigation Study plans to examine potential upland sites, and expansion of Bartram Island CDFs into Mill Cove, but environmental concerns, future development, and real estate costs may prove problematic.

The Jacksonville District Engineering Division indicates previous disposal operations have already reached the required draft limits for the existing Jacksonville Harbor ODMDS based on surveys of pinnacle mounds in certain areas of the ODMDS. As noted earlier, depths in the release zone area range from 30 to 55 feet based on a 12 -14 Feb 2010 hydrographic survey, and the SMMP requires a warning when depths mound to 30 feet that the cutoff depth for disposal in that area at 25 feet will soon occur.

As mentioned earlier, extreme hurricane events during 2004 to 2005 impacted the St. Johns River watershed and increased shoaling in the Jacksonville Harbor Federal channel. Flows in the St. Johns River increased significantly as documented by Acoustic Doppler Current Profiler (ADCP) surveys taken in 2000 and 2004 near the mouth of the St. Johns River at about river mile four, the Mile Point Training Wall area of the river. A March 2000 ADCP survey recorded ebb flows of 217,500 cubic feet per second in this area as compared to an October 2004 ADCP survey with ebb flows of 295,000 cubic feet per second. The resulting 35 percent increase in ebb flows have increased shoaling in Jacksonville Harbor.

Based on those new O&M developments including increased shoaling rates due to extreme hurricane events in 2004 to 2005, temporary suspension of mining of construction grade material from the Confined Disposal Facility (CDF) at Buck Island in 2008, constraints on expansion of existing CDFs, and a lack of potential new upland areas for development of CDFs, the USACE Jacksonville District will require access to an expanded ODMDS by 2012.

METHODOLOGY AND SUPPORTING ANALYSES

An initial ZSF analysis for segment two (about river miles 14 – 20, **Figure 7**) of Jacksonville Harbor was presented to EPA on July 1, 2009. The zone of siting feasibility threshold is the radial distance offshore from the mouth of the river where the benefit to cost ratio remains greater than or equal to one (i.e., costs above this amount would result in an unjustified project, and therefore a closer siting would be required).

The current authorized upland site for segment two, river miles 14 – 20, is the west end of Bartram Island at about river mile 14, **Figure 5**. The benefit/cost analysis that was conducted for the authorized project (i.e., placement of material at Bartram Island from deepening segment two of Jacksonville Harbor from an existing project depth of 38 feet to a new project depth of 40 feet) resulted in a benefit to cost ratio of 1.7 at a 5.875 discount rate with 2002 price levels.

The initial phase of the ZSF exercise involved substituting the existing Jacksonville ODMDS as the placement site for the material instead of the authorized Bartram Island location. This evaluation involved estimating costs of transporting the dredged material to the existing Jacksonville ODMDS, located approximately 5 miles offshore, **Figure 1**, instead of Bartram Island, the authorized upland disposal location.

Results of this analysis yielded a benefit to cost ratio of 0.6, confirming that if all dredge material were to be placed in the ODMDS from segment two of Jacksonville Harbor, it would not result in an economically justified project. During presentation of the results of this initial or phase I analysis at the EPA Regional Office in Atlanta on July 1, 2009, EPA representatives requested additional information. EPA officials wanted to know the economic impact of not only new construction material, but also operations and maintenance (O&M) material normally taken to the ODMDS from other segments of the Jacksonville Harbor project.

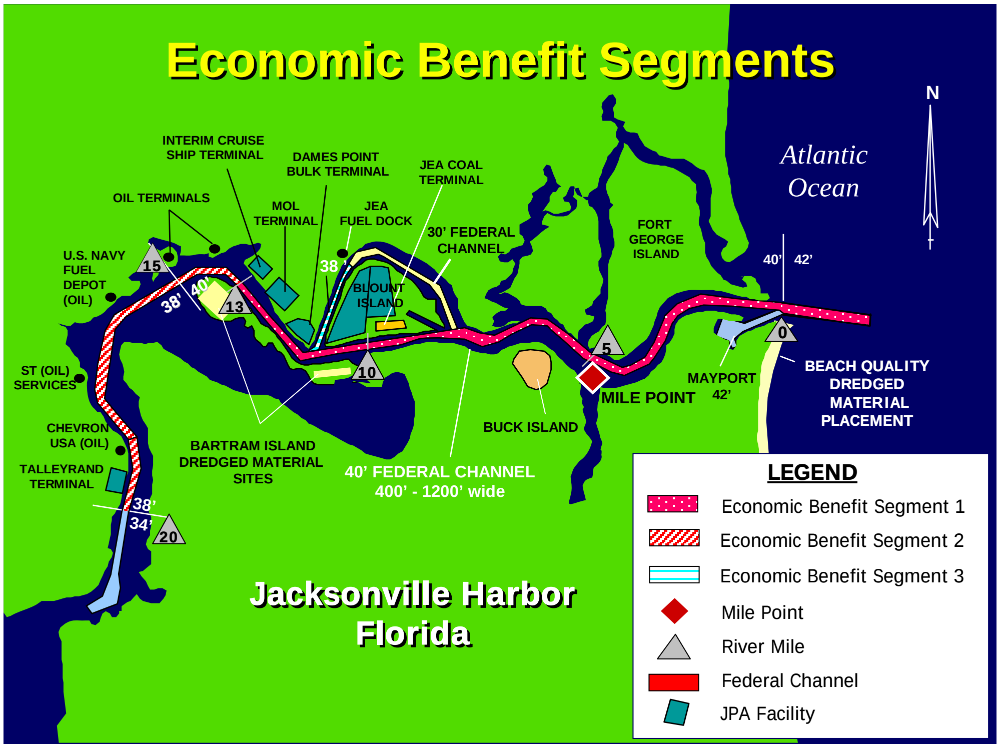


Figure 6: Site Map showing Economic Segments and Upland Disposal Sites

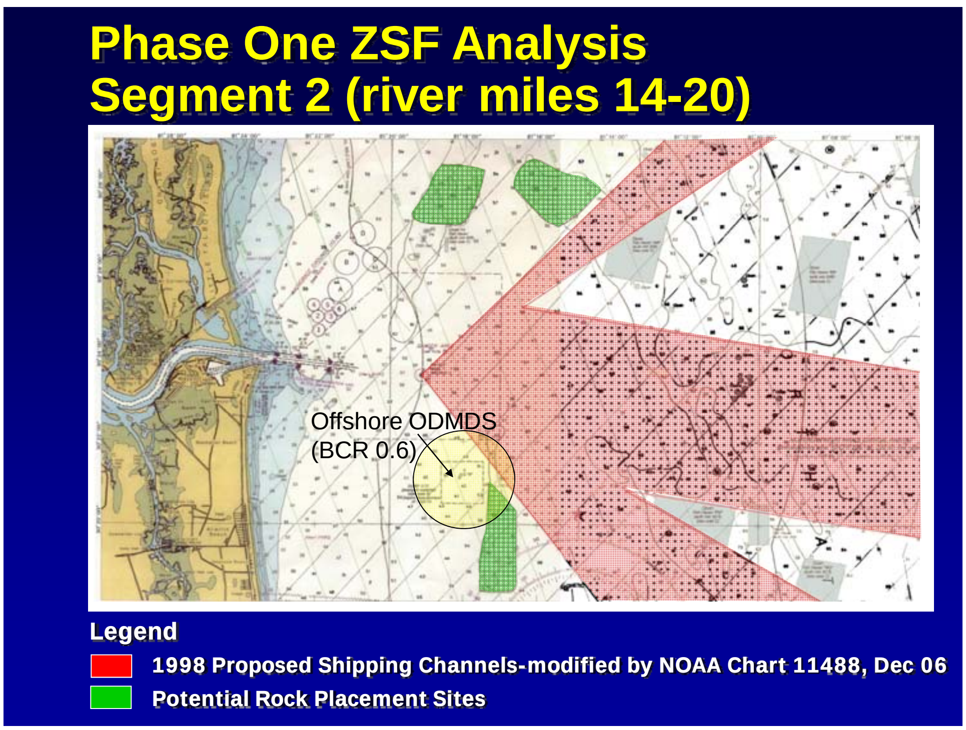


Figure 7: Phase One Result- Segment 2 ZSF Analysis

As a result of this request, the next phase of the ZSF analysis included not only new construction material, but also O&M material. For this phase II analysis, available benefit and cost information from the entrance channel to river mile 18.5 provided the basis for the life-cycle cost approach to evaluate new construction as well as maintenance material quantities and costs over a fifty year planning horizon. Material from the entrance channel to barcut 3 would normally be considered for nearshore placement, beach placement, or other beneficial use of dredged material, but in this analysis represents the portion of dredged material evaluated for ODMDS placement offshore at distance intervals of 5, 10, and 15 miles. Placement of the remaining material from barcut 3 to terminal channel, occurred in accordance with previously analyzed costs and benefits from the 2007 Jacksonville Harbor Study, and includes; from river mile 2 to 6.5 (barcut-3 to cut 19) placement of material into the Buck Island upland confined disposal facility; from river mile 6.5 to 11 (cut 19 to cut 42) potential rock material, provided bedding material for future offshore rock placement sites; and from river mile 11 to 18.5 (cut 42 to terminal channel) disposal of material occurred in the Bartram Island upland disposal site, refer to **Figure 5**.

RESULTS

Using commercial ship transportation savings (refer to page 31), to justify the depth and length of the project, the 2007 preliminary findings concluded that the entrance channel to river mile 18.5 had economic justification to a depth of 43 feet, with material slated for placement in accordance with the discussion above and a benefit cost ratio of 1.17. Economic justification of the ZSF takes into account all benefits and costs associated with Segments 1 & 2 of the Jacksonville Harbor Project, as defined in the 2007 analysis, and shown in **Figure 6**. **Table 1** contains the results of this analysis. This analysis involved taking dredged material from the entrance channel to barcut 3 five miles offshore. Costs required escalation from this point in order to take the material to 10 and 15 miles offshore.

The first scenario of the five mile increments assumes a onetime construction cost at year 1 with no additional maintenance or new construction over the 50 year planning horizon, **Table 1 and Figure 8**. The second scenario of the five mile increments assumes routine operation and maintenance (O&M) of the channel every 3 to 4 years in addition to new construction costs occurring every ten years over the planning horizon of 50 years, **Tables 2 and 3,** and **Figure 9**. The third scenario of the five mile increments assumes only O&M construction, **Table 4 and Figure 10**.

Scenario 1: One-time New Construction Costs

5 Mile Increment

The 5 mile zone of siting feasibility assumes equitable benefits as presented in the 2007 study because the ODMDS site evaluated in that study was approximately 5 miles offshore. Estimated new Construction for this option includes Interest During Construction (IDC)[4] and is $348,453,330. Using a Capital Recovery Factor of 4.875%, the AAEQ costs and benefits, in FY07 price levels, amount to $18,719,708 and $21,897,161, respectively. Thus, the AAEQ benefit to cost ratio (BCR) for the 5 mile offshore option is 1.17. A BCR greater than or equal to 1 is considered economically justified.

10 Mile Increment

The 10 mile zone of siting feasibility assumes the same economic return of benefits as the 5 mile, because the constructed project has not changed to realize further benefits, only the distance to the disposal site has changed. The costs are therefore the only component to change, and the increase in costs in addition to interest during construction, results in a revised new construction cost of $379,756,127. The BCR of this alternative is 1.07, and is therefore also economically justified.

15 Mile Increment

The 15 mile zone of siting feasibility also assumes the same economic return and benefit as the 5 mile option, similarly because the constructed project dimensions have not changed. Estimated new construction costs and IDC associated with taking the material 15 miles offshore does not prove to be economically justified, with a total new construction cost of $415,934,143 and a BCR of 0.98.

Based on this one time construction cost analysis, location of the ODMDS should be no greater than 10 miles offshore to remain economically justified.

Table 1: Shows Results of One-Time Construction Costs and Benefits for the Five Mile Increments

	Total New Construction Costs [1,4]	AAEQ Cost[2]	AAEQ Benefits [3]	BCR
5mile	$348,453,330	$18,719,708	$ 21,897,161	1.17
10mile	$379,756,127	$20,401,366	$ 21,897,161	1.07
15 mile	$415,934,143	$22,344,931	$ 21,897,161	0.98

Notes

1. New Construction Total Costs for Segments 1&2 plus Interest During Construction (IDC)
2. FY07 Cost level
3. Benefits listed for Segment 1&2, in FY07 Cost levels
4. IDC (FY07 costs) equivalent for portion of material (Segments 1&2) going to the ODMDS.

	IDC[4]
5 mi	$9,138,168.60
10 mi	$22,845,421.50
15 mi	$57,113,553.75

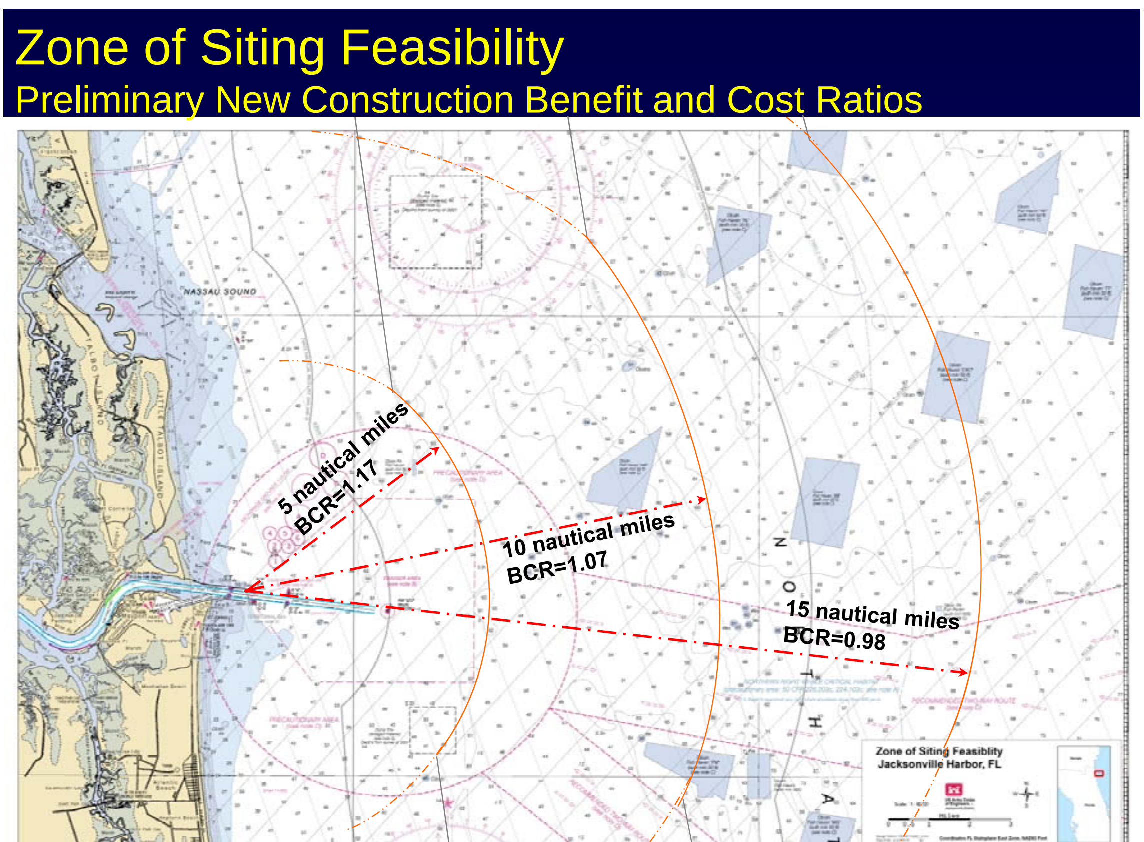


Figure 8: Scenario 1: One-time Preliminary New Construction Costs

Scenario 2: New Construction and O&M for 50 year Project

Historical operations of Jacksonville Harbor and vessel fleet growth, however, provide evidence that future maintenance and potential new construction will occur within the projected 50 year planning horizon. With post-panamax vessel fleet operations in the Atlantic Ocean anticipated to increase beginning in 2014, ships with drafts approaching 50 feet are expected to call at Jacksonville Harbor within the next 50 years. It is anticipated that new construction work will occur approximately every ten years based on completion of two new construction deepening projects within the last twenty years, with maintenance dredging (O&M) occurring every 3 to 4 years. For simplicity, new construction costs are assumed to remain constant, each time providing an additional three feet of channel depth. Over the next 50 years, this would mean there would be four new construction costs, the first beginning in year 2014 from 40 to 43 ft, and the last in 2044 ending at a project depth of 52 ft. O&M costs would also remain constant occurring every 3 to 4 years depending on when new construction fits into the cycle. Planned O&M occurs at year one (2010), with a smaller cost than the rest due to construction dredging also taking place at the present time. Results of this analysis are presented in Tables 3 and 4 and described below.

5 Mile Increment

The 5 mile zone of siting feasibility assumes equitable benefits as presented in the 2007 study because the ODMDS site evaluated in that study was approximately 5 miles offshore. The present value (worth) of estimated construction costs and O&M cost over the 50 year planning horizon (2010 to 2059), is $616,751,197. Using a Capital Recovery Factor of 4.875%this equates the AAEQ costs and benefits, in FY07 price levels, to $31,393,194 and $21,897,161, respectively. Thus, the AAEQ benefit to cost ratio (BCR) for the 5 mile offshore option is 0.70. This is not an economically justified option.

10 Mile Increment

The 10 mile zone of siting feasibility assumes the same economic return of benefits as the 5 mile, because the constructed project has not changed to realize further benefits, only the distance to the disposal site has changed. The costs are therefore the only component to change, and the present value (worth) of new construction costs in addition to O&M over the course of the 50 year project for the 10 mile option in FY09 cost levels is $632,560,611. The BCR of this alternative is 0.68, and is therefore also not economically justified.

15 Mile Increment

The 15 mile zone of siting feasibility also assumes the same economic return and benefit as the 5 mile increment, similarly because the constructed project dimensions have not changed. The present value (worth) of estimated new construction costs and O&M associated with the 15 mile option does not prove to be economically justified either, with a total new construction cost of $636,130,765 and a BCR of 0.68.

Based on this analysis of multiple new construction and O&M costs over the 50 year planning horizon, without the addition of IDC, the zone of siting feasibility suggests that the ODMDS siting is not economically justified at the 5 mile limit.

Table 2: Results of Multiple New Construction and O&M Costs over a 50-yr Planning Horizon

	Total New Construction Costs + O&M[5]	AAEQ Cost[5]	AAEQ Benefits[3]	BCR
5 mile	$616,751,197	$31,393,194	$ 21,897,161	0.70
10 mile	$632,560,611	$32,197,908	$ 21,897,161	0.68
15 mile	$636,130,765	$32,379,632	$ 21,897,161	0.68

Notes

5. New construction total costs for segments 1&2 estimated every ten years, plus O&M routine maintenance costs, without IDC, in FY09 cost levels.

6. AAEQ Costs deflated to FY 07 1Q to match AAEQ Benefits, per EM 1110-2-1304 Revision of 31 March 2008.

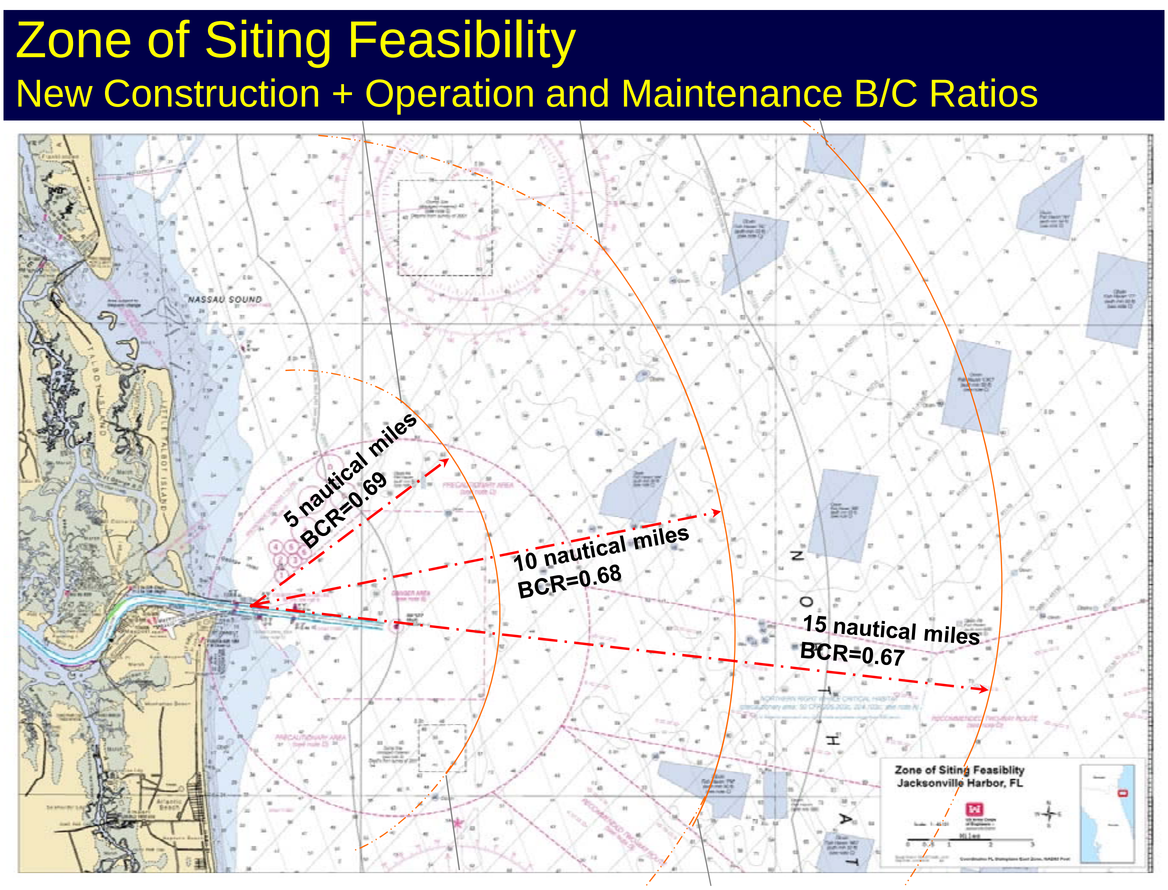


Figure 9: Scenario 2: New Construction and O&M for 50 year Project

Table 3: Results of Multiple New Construction and O&M Costs

JACKSONVILLE HARBOR-ODMDS COSTS revised 1/27/2010

Project Economic Life: 50 Years
Current Rate: 4.875% FY07 4 7/8
-0.25%: 4.625%
+0.25%: 5.125%

	ODMDS Placement 5 Miles	ODMDS Placement 10 Miles	ODMDS Placement 15 Miles
Average Annual Equivalent (AAEQ) or Capital Recovery Factor(S):			
4.875% ----->	0.053722	0.053722	0.053722
4.625% ----->	0.051635	0.051635	0.051635
5.125% ----->	0.055838	0.055838	0.055838
Total Present Valuation(s), Excluding Base Period:			
4.875% ----->	$ 616,751,197	$ 632,560,611	$ 636,130,765
4.625% ----->	$ 638,626,500	$ 654,993,633	$ 658,689,734
5.125% ----->	$ 596,033,107	$ 611,314,085	$ 614,764,906
Average Annual Equivalent Valuations:			
4.875% ----->	$ 33,133,282	$ 33,982,600	$ 34,174,396
4.625% ----->	$ 32,975,346	$ 33,820,460	$ 34,011,307
5.125% ----->	$ 33,281,338	$ 34,134,598	$ 34,327,285

		Applied Discount Factors			ODMDS Placement 5 Miles				ODMDS Placement 10 Miles				ODMDS Placement 15 Miles			
Year	Period	4.875%	4.625%	5.125%	Stream Values [1]	4.875%	4.625%	5.125%	Stream Values	4.875%	4.625%	5.125%	Stream Values	4.875%	4.625%	5.125%
2009	0	1.00000	1.00000	1.00000		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2010	1	0.95352	0.95579	0.95125	$ 2,105,500	$ 2,007,628	$ 2,012,425	$ 2,002,854	$ 2,105,500	$ 2,007,628	$ 2,012,425	$ 2,002,854	$ 2,105,500	$ 2,007,628	$ 2,012,425	$ 2,002,854
2011	2	0.90919	0.91354	0.90487		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2012	3	0.86693	0.87316	0.86076		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2013	4	0.82663	0.83456	0.81880	$ 4,105,500	$ 3,393,737	$ 3,426,290	$ 3,361,569	$ 4,105,500	$ 3,393,737	$ 3,426,290	$ 3,361,569	$ 4,105,500	$ 3,393,737	$ 3,426,290	$ 3,361,569
2014	5	0.78821	0.79767	0.77888	**$ 335,618,732**	$ 264,536,938	$ 267,712,615	$ 261,406,359	**$ 344,544,889**	$ 271,572,596	$ 274,832,734	$ 268,358,755	**$ 346,560,635**	$ 273,161,420	$ 276,440,631	$ 269,928,777
2015	6	0.75157	0.76241	0.74091		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2016	7	0.71663	0.72870	0.70479		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2017	8	0.68332	0.69649	0.67043	$ 4,105,500	$ 2,805,371	$ 2,859,449	$ 2,752,441	$ 4,105,500	$ 2,805,371	$ 2,859,449	$ 2,752,441	$ 4,105,500	$ 2,805,371	$ 2,859,449	$ 2,752,441
2018	9	0.65156	0.66570	0.63774		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2019	10	0.62127	0.63628	0.60665		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2020	11	0.59239	0.60815	0.57708	$ 4,105,500	$ 2,432,060	$ 2,496,755	$ 2,369,190	$ 4,105,500	$ 2,432,060	$ 2,496,755	$ 2,369,190	$ 4,105,500	$ 2,432,060	$ 2,496,755	$ 2,369,190
2021	12	0.56485	0.58127	0.54894		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2022	13	0.53860	0.55557	0.52218		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2023	14	0.51356	0.53101	0.49672	$ 4,105,500	$ 2,108,426	$ 2,180,065	$ 2,039,304	$ 4,105,500	$ 2,108,426	$ 2,180,065	$ 2,039,304	$ 4,105,500	$ 2,108,426	$ 2,180,065	$ 2,039,304
2024	15	0.48969	0.50754	0.47251	**$ 335,618,732**	$ 164,348,818	$ 170,339,013	$ 158,582,792	**$ 344,544,889**	$ 168,719,859	$ 174,869,371	$ 162,800,480	**$ 346,560,635**	$ 169,706,948	$ 175,892,437	$ 163,752,937
2025	16	0.46693	0.48510	0.44947		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2026	17	0.44522	0.46366	0.42756		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2027	18	0.42453	0.44316	0.40672	$ 4,105,500	$ 1,742,892	$ 1,819,397	$ 1,669,775	$ 4,105,500	$ 1,742,892	$ 1,819,397	$ 1,669,775	$ 4,105,500	$ 1,742,892	$ 1,819,397	$ 1,669,775
2028	19	0.40479	0.42357	0.38689		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2029	20	0.38598	0.40485	0.36803		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2030	21	0.36803	0.38695	0.35009	$ 4,105,500	$ 1,510,966	$ 1,588,624	$ 1,437,275	$ 4,105,500	$ 1,510,966	$ 1,588,624	$ 1,437,275	$ 4,105,500	$ 1,510,966	$ 1,588,624	$ 1,437,275
2031	22	0.35093	0.36984	0.33302		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2032	23	0.33461	0.35350	0.31678		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2033	24	0.31906	0.33787	0.30134	$ 4,105,500	$ 1,309,902	$ 1,387,122	$ 1,237,149	$ 4,105,500	$ 1,309,902	$ 1,387,122	$ 1,237,149	$ 4,105,500	$ 1,309,902	$ 1,387,122	$ 1,237,149
2034	25	0.30423	0.32293	0.28665	**$ 335,618,732**	$ 102,104,961	$ 108,382,563	$ 96,204,630	**$ 344,544,889**	$ 104,820,558	$ 111,265,119	$ 98,763,300	**$ 346,560,635**	$ 105,433,806	$ 111,916,071	$ 99,341,111
2035	26	0.29009	0.30866	0.27267		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2036	27	0.27660	0.29501	0.25938		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2037	28	0.26375	0.28197	0.24674	$ 4,105,500	$ 1,082,806	$ 1,157,638	$ 1,012,973	$ 4,105,500	$ 1,082,806	$ 1,157,638	$ 1,012,973	$ 4,105,500	$ 1,082,806	$ 1,157,638	$ 1,012,973
2038	29	0.25149	0.26951	0.23471		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2039	30	0.23980	0.25759	0.22326		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2040	31	0.22865	0.24621	0.21238	$ 4,105,500	$ 938,717	$ 1,010,803	$ 871,926	$ 4,105,500	$ 938,717	$ 1,010,803	$ 871,926	$ 4,105,500	$ 938,717	$ 1,010,803	$ 871,926
2041	32	0.21802	0.23532	0.20203		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2042	33	0.20789	0.22492	0.19218		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2043	34	0.19822	0.21498	0.18281	$ 4,105,500	$ 813,802	$ 882,592	$ 750,519	$ 4,105,500	$ 813,802	$ 882,592	$ 750,519	$ 4,105,500	$ 813,802	$ 882,592	$ 750,519
2044	35	0.18901	0.20547	0.17390	**$ 335,618,732**	$ 63,434,732	$ 68,961,184	$ 58,362,768	**$ 344,544,889**	$ 65,121,850	$ 70,795,284	$ 59,914,992	**$ 346,560,635**	$ 65,502,843	$ 71,209,469	$ 60,265,522
2045	36	0.18022	0.19639	0.16542		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2046	37	0.17185	0.18771	0.15735		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2047	38	0.16386	0.17941	0.14968	$ 4,105,500	$ 672,715	$ 736,577	$ 614,522	$ 4,105,500	$ 672,715	$ 736,577	$ 614,522	$ 4,105,500	$ 672,715	$ 736,577	$ 614,522
2048	39	0.15624	0.17148	0.14239		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2049	40	0.14898	0.16390	0.13544		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2050	41	0.14205	0.15666	0.12884	$ 4,105,500	$ 583,197	$ 643,149	$ 528,956	$ 4,105,500	$ 583,197	$ 643,149	$ 528,956	$ 4,105,500	$ 583,197	$ 643,149	$ 528,956
2051	42	0.13545	0.14973	0.12256		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2052	43	0.12915	0.14311	0.11658		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2053	44	0.12315	0.13679	0.11090	$ 4,105,500	$ 505,591	$ 561,572	$ 455,304	$ 4,105,500	$ 505,591	$ 561,572	$ 455,304	$ 4,105,500	$ 505,591	$ 561,572	$ 455,304
2054	45	0.11743	0.13074	0.10549		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2055	46	0.11197	0.12496	0.10035		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2056	47	0.10676	0.11944	0.09546		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2057	48	0.10180	0.11416	0.09081	$ 4,105,500	$ 417,937	$ 468,666	$ 372,801	$ 4,105,500	$ 417,937	$ 468,666	$ 372,801	$ 4,105,500	$ 417,937	$ 468,666	$ 372,801
2058	49	0.09707	0.10911	0.08638		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -
2059	50	0.09256	0.10429	0.08217		$ -	$ -	$ -		$ -	$ -	$ -		$ -	$ -	$ -

Maintenance		
Unit Price/CY [4]	$	7.82
Cuts 3-13 (CY) [3]		525000
Total Maintenance	**$**	**4,105,500**

ODMDS Distance	AAEQ Cost[5]	AAEQ Cost[6]	AAEQ Benefits [2]	Net AAEQ Benefits	BCR
5 Miles	$ 33,133,282	$ 31,393,194	$ 21,897,161	$ (11,236,121)	0.70
10 Miles	$ 33,982,600	$ 32,197,908	$ 21,897,161	$ (12,085,439)	0.68
15 Miles	$ 34,174,396	$ 32,379,632	$ 21,897,161	$ (12,277,235)	0.68

ASSUMPTIONS:
- New construction dredging every 10 years
- Benefits are obtained from transportation savings
- Maintenance costs occur every third year and restart after new construction
- The same monitary benefits are obtainable everytime channel is deepened

NOTES:
[1] New construction costs from Jax Harbor GRR-2 Revised Plan Alternatives; costs represent FY 09 prices
[2] Benefits listed for Segment 1&2
[3] Maintenance quantities from Jax Harbor DMMP Table 2B-Plan2
[4] Unit Pricing from 2007 Norfolk Dredging Solicitation number W912EP-07-B-0016 and inflated to match new construction prices of FY 09
[5] AAEQ Costs FY 09 1Q
[6] AAEQ Costs deflated to FY 07 1Q to match AAEQ Benefits, per EM 1110-2-1304 Revision of 31 March 2008.

File: Comparison of Disposal Distances

Scenario 3: O&M for 50 year Project Scenario

For the third scenario, O&M material was considered separately excluding any new project construction throughout the 50-yr planning horizon. Typically shoal material from the entrance channel to about river mile 5 is taken offshore, near shore, or placed on the beach south of the entrance channel if it meets the requirements for beach placement. Historical records of O&M dredging events were used to provide detailed estimates of shoaling depths and locations, (places where sediment accumulates regularly and routinely throughout the year). To analyze this scenario, costs and benefits were taken from a 2002 report which analyzed removal of two feet of material from within the channel. Dredge quantities were taken out of the 2002 Jacksonville GRR report, and from segment 3A2. This segment represents a shoaling problem area addressed by a recently received letter from the St. Johns Bar Pilots, which resulted in a two-foot reduction in the draft of ships allowed to transit that segment of the river.

5 Mile Increment

The 5 mile zone of siting feasibility assumes equitable benefits to those presented in the 2002 Report for removal of shoaled material. Costs were first derived in 2009 price levels for material taken offshore so that 2002 excavation volumes could be matched to 2009 price levels for the same excavation volume. Costs were then transferred back to 2002 price levels for comparison with the benefits. This option does not include Interest During Construction (IDC). The estimated cost for O&M is $24,528,484. Using a Capital Recovery Factor of 4.625%this equates the AAEQ costs and benefits, in FY02 price levels, to $1,266,523 and $851,000, respectively. Thus, the AAEQ benefit to cost ratio (BCR) for the 5 mile offshore option is 1.02. A BCR greater than 1 is considered economically justified.

10 Mile Increment

The 10 mile zone of siting feasibility assumes the same economic return of benefits as the 5 mile, because the O&M is assumed not to change without new construction projects taking place, and thus no further benefits are realized. The costs are therefore the only component to change, and the increase in costs results in a new total construction cost of $25,949,544. The BCR of this alternative is 0.96, and is therefore not economically justified.

15 Mile Increment

The 15 mile zone of siting feasibility also assumes the same economic return and benefit as the 5 mile option, similarly because O&M has not changed. Total construction costs associated with taking the shoaled material 15 miles offshore also does not prove to be economically justified, with a total new construction cost of $27,302,254 and a BCR of 0.92.

Based on this O&M analysis of shoaled material, the zone of siting feasibility suggests that the ODMDS siting should be no greater than 5 miles offshore to remain economically justified.

Table 4: Results of O&M Construction

	Quantities 38-40[1]	Total Cost	AAEQ Cost[2]	AAEQ Cost[3]	AAEQ Benefits[4]	BCR
5 Miles	380,778.67	$24,528,484	1,266,523	$835,390	$851,000	**1.02**
10 Miles	380,778.67	$25,949,544	1,339,899	$883,788	$851,000	**0.96**
15 Miles	380,778.67	$27,302,254	1,409,746	$929,859	$851,000	**0.92**

Notes

1. *Quantities were taken from the 2002 Jacksonville Harbor GRR for 2 feet of dredged material, segment 3A2.*
2. *Costs were derived in 2009 for 5, 10, 15 ODMDS locations. Quantities from the 2002 report were matched with the 2009 costs. 380,778.67 Cubic Yards of Material is equivalent to 2/3 of the quantities assumed in the 2009 estimates, thus the total 2009 equivalent costs are shown in AAEQ Costs[3].*
3. *Costs were deflated to 2002 to match the 2002 benefits.*
4. *Benefits were taken from the 2002 report.*

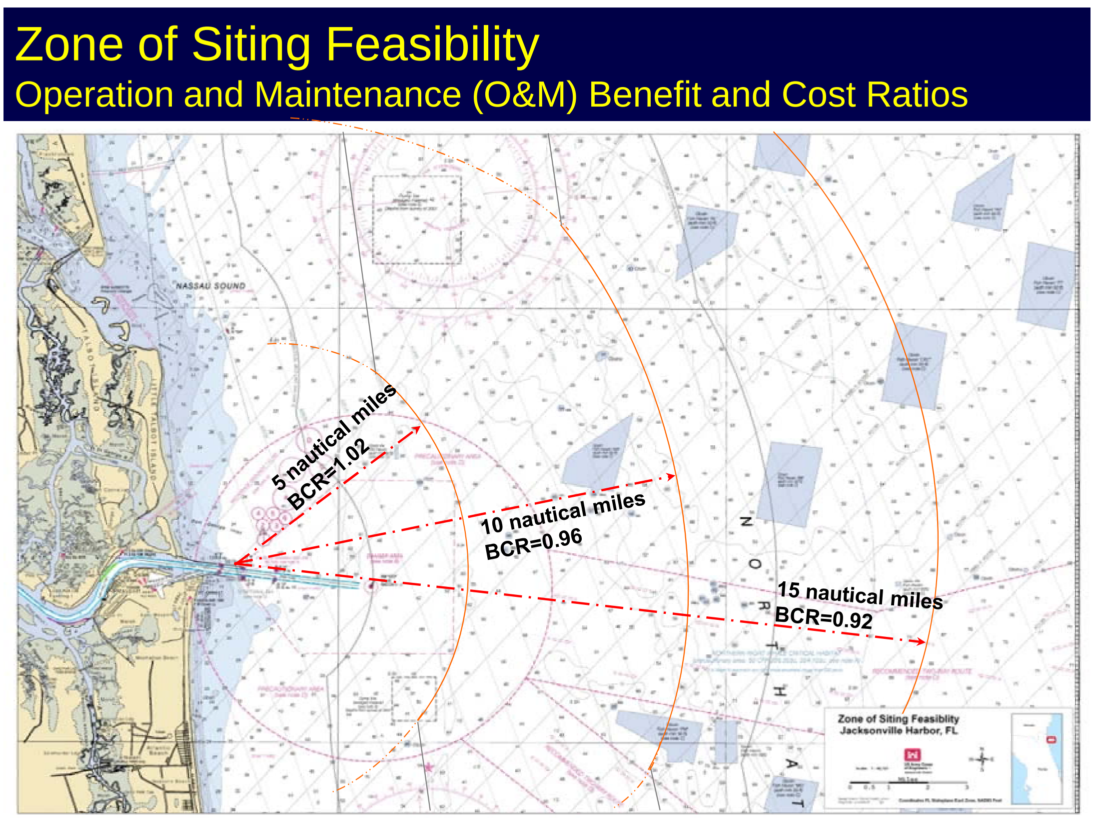


Figure 10: Scenario 3 O&M for 50 year Project Scenario

CONCLUSIONS

This report presented the results of the ZSF analysis for segments 1 & 2 (the entrance channel to Terminal channel-river mile 18.5) and evaluated economic justification for placement of a portion of dredged material at distances 5, 10, and 15 miles offshore. The three different scenarios presented capture the substantial BCR variability that can exist within a project of this scale and it is important to understand the distinction of assumptions of these three scenarios.

The one-time construction scenario 1 analysis found that the ODMDS should be sited no greater than 10 miles to remain economically justified with a BCR of 1.07. However, this scenario does not account for any future maintenance or new construction after the initial work has been completed. With the inclusion of maintenance work, IDC, and new construction, however, not even a 5 mile ODMDS siting was economically justified with a BCR of 0.70. The one-time construction scenario is very unlikely considering the growth of larger vessels in the world transiting the Atlantic Ocean and the expansion of the Panama Canal scheduled for completion in 2014, which would allow more efficient flow of Asian traffic by the U.S. east Atlantic coast on larger Post-Panamax ships, as well as the necessity for maintenance dredging due to shoaling of the channel during storms and normal conditions. Therefore, the second scenario of multiple construction and maintenance over the 50 year project is more realistic.

This scenario, although more realistic, had economic benefits that were based on conditions in 2007, and the preliminary economic benefits for navigation are currently being reevaluated as part of the Jacksonville Harbor GRR2 deepening study. Benefits and costs are most likely subject to change. Benefits may increase, but so will the costs. Actual benefits and costs for the study remain under development.

Lastly, the O&M scenario 3 is highly unlikely, and even less probable than the first scenario, due to the forecasted economic growth as larger vessels begin transiting the Atlantic Ocean. Larger ships equates to deeper harbors, and O&M construction simply maintains channel depth and does not provide increased clearance, a necessity for these larger ships. The economic benefits for this scenario were taken from the Jacksonville Harbor GRR Study in 2002, and navigation benefits are currently being re-evaluated as part of the GRR2 Study. Benefits and costs are most likely going to change with the BCR reevaluation to be addressed in the GRR.

U.S. Army
Corps of Engineers
Jacksonville District

Jacksonville Harbor ODMDS EPA Site Designation
Duval County, Florida

jacksonville harbor

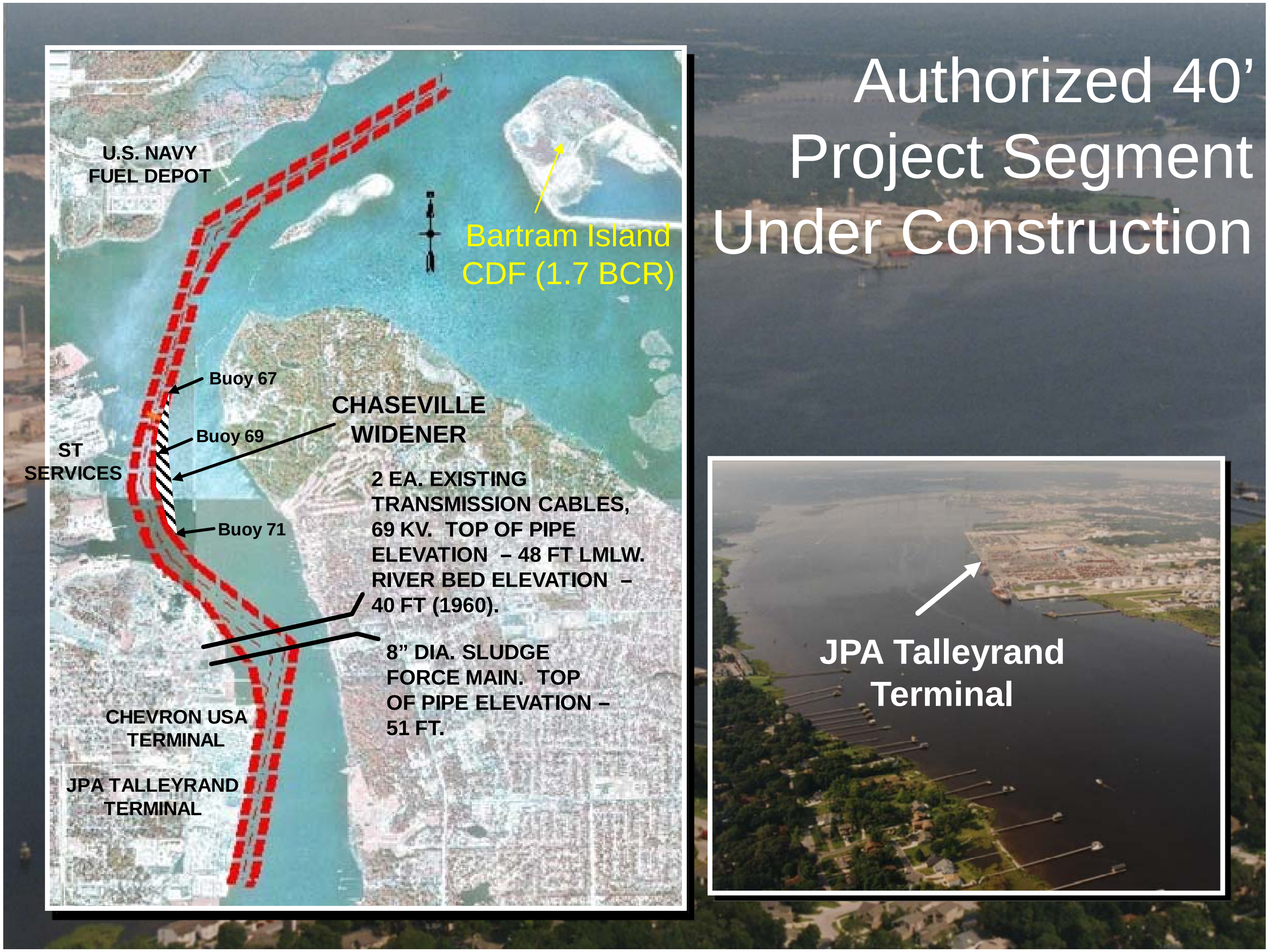
Zone of Siting Feasibility Study
February 11, 2010

Existing Federal Project
Atlantic Ocean
N
Segment 1
River Mile 14
JEA
FUEL DOCK
JEA COAL
TERMINAL
River Mile 0
River
Mile 15
OIL TERMINALS
JPA MOL
TERMINAL
JPA BULK
TERMINAL
30' FEDERAL
CHANNEL
FORT
GEORGE
ISLAND
U.S.
NAVY
FUEL
DEPOT
JPA
38'
40'
42'
River Mile 5
38'
40'
JPA
JPA
River
Mile 10
ST
SERVICES
Segment 2
River Mile 18.2
MAYPORT
42'
BEACH QUALITY
DREDGED
MATERIAL
PLACEMENT
CHEVRON
USA
BARTRAM ISLAND
DREDGED MATERIAL
SITES
BUCK ISLAND
JPA
TALLEYRAND
TERMINAL
38'
34'
40' FEDERAL CHANNEL
400' – 1200' wide
LEGEND
Cuts F and G
JPA Facility
River Mile
Federal Channel
Jacksonville Harbor, Florida

Phase One

- Meeting on July 1, 2009- ZSF analysis included Segment two (river miles 14-20) with all material taken offshore.

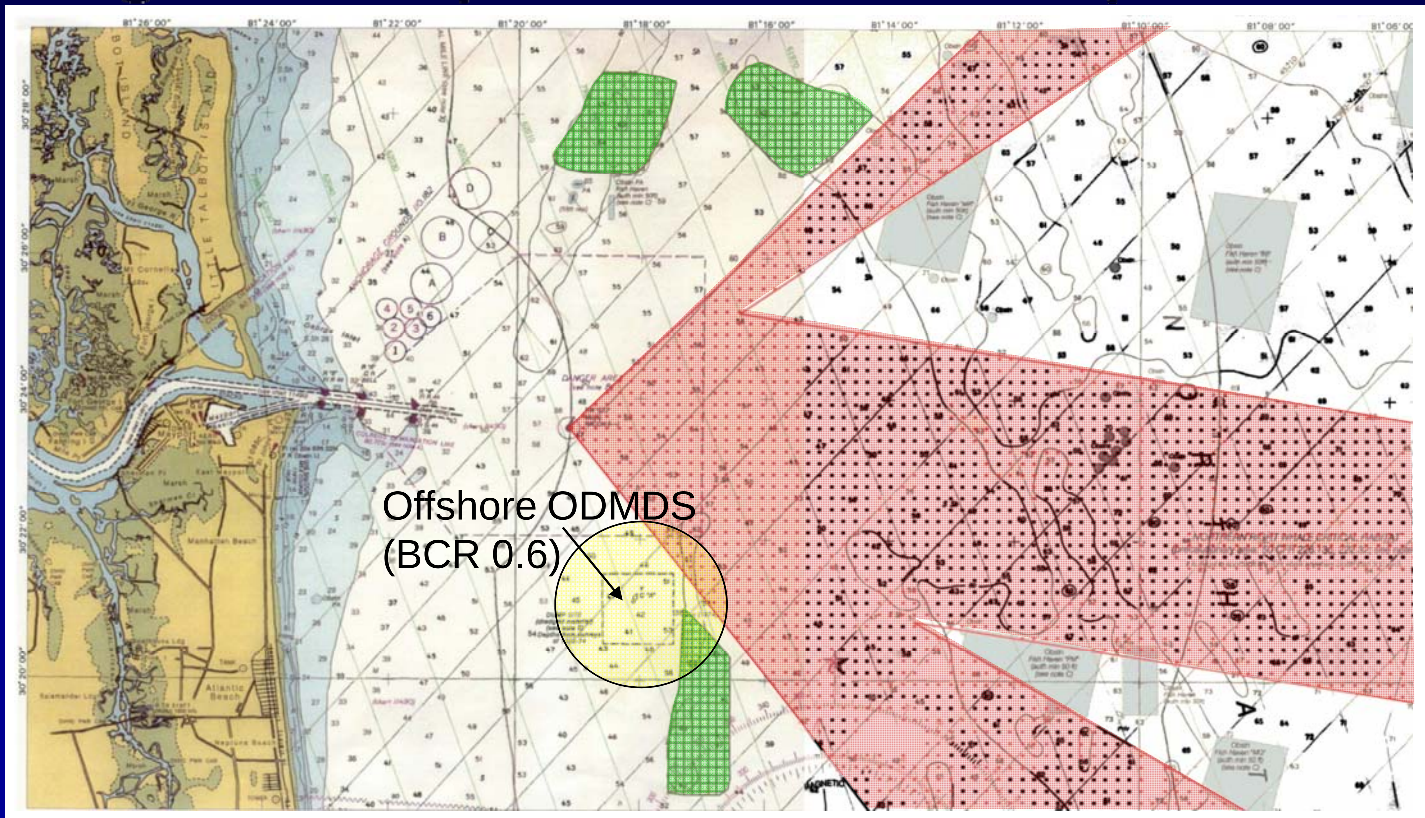
- The Benefit/Cost Ratio (BCR) for the authorized project with material placement in west end of Bartram island was **1.7**.


Authorized 40'
Project Segment
Under Construction
U.S. NAVY
FUEL DEPOT
Bartram Island
CDF (1.7 BCR)
Buoy 67
CHASEVILLE
WIDENER
Buoy 69
ST
SERVICES
2 EA. EXISTING
TRANSMISSION CABLES,
69 KV. TOP OF PIPE
ELEVATION – 48 FT LMLW.
RIVER BED ELEVATION –
40 FT (1960).
Buoy 71
8" DIA. SLUDGE
FORCE MAIN. TOP
OF PIPE ELEVATION –
51 FT.
CHEVRON USA
TERMINAL
JPA TALLEYRAND
TERMINAL
JPA Talleyrand
Terminal

Phase One

- Meeting on July 1, 2009- ZSF analysis for Segment two (river miles 14-20) with all material offshore.
- The benefit/cost ratio for the authorized project placement at west end of Bartram island was **1.7**.
- The benefit/cost ratio for taking that material to the existing ODMDS (~5miles offshore) was **0.6**.

Phase One ZSF Analysis
Segment 2 (river miles 14-20)



Legend

- 1998 Proposed Shipping Channels-modified by NOAA Chart 11488, Dec 06
- Potential Rock Placement Sites

Phase Two

- ZSF analysis of phase two included Segments 1 & 2 (entrance channel to river mile 18.5).

- Segment 1: entrance channel to river mile 14.

- Segment 2: River mile 14 to 18.5.

Material Placement

- Entrance Channel to Barcut 3 → ODMDS

Entrance Channel - Bar Cut-3	Dredging	Dredging	Dredging
Station 0+00 - 210+00	Uncl.	Rock	Total
Project Depth (2' Req. OD + 2' OD)	Vol/Cyds	Vol/Cyds	Vol/Cyds
41	**209,000**	**209,000**	**418,000**
42	325,875	325,875	651,750
43	442,750	442,750	885,500
44	559,625	559,625	1,119,250
45	**676,500**	**676,500**	**1,353,000**

- Barcut 3 to Cut 19 → Buck Island

Bar Cut-3 Station 210+00 to	Dredging	Dredging	Dredging
Cut-19 Station 0+00	Uncl.	Rock	Total
Project Depth (2' Req. OD + 2' OD)	Vol/Cyds	Vol/Cyds	Vol/Cyds
41	**642,400**	**642,400**	**1,284,800**
42	1,091,613	1,091,613	2,183,225
43	1,540,825	1,540,825	3,081,650
44	1,990,038	1,990,038	3,980,075
45	**2,439,250**	**2,439,250**	**4,878,500**

Material Placement

- Cut 19 to Cut 42 → Buck Isl. or Rock Placement Areas

Cut-19 Station 0+00 to	Dredging	Dredging	Dredging
Cut-42 Station 0+00	Uncl.	Rock	Total
Project Depth (2' Req. OD + 2' OD)	Vol/Cyds	Vol/Cyds	Vol/Cyds
41	**-**	**443,840**	**443,840**
42	-	754,205	754,205
43	-	1,064,570	1,064,570
44	-	1,374,935	1,374,935
45	**-**	**1,685,300**	**1,685,300**

- Cut 43 to Terminal Channel → Bartram Isl.

Cut-43 Station 0+00 to	Dredging	Dredging	Dredging
Terminal Channel Station 0+00	Uncl.	Rock	Total
Project Depth (2' Req. OD + 2' OD)	Vol/Cyds	Vol/Cyds	Vol/Cyds
41	**462,124**	**699,236**	**1,161,360**
42	926,731	1,541,339	2,468,070
43	1,391,338	2,383,442	3,774,780
44	1,855,945	3,225,545	5,081,490
45	**2,320,552**	**4,067,648**	**6,388,200**

Material Placement-Totals

- Entrance Channel to River Mile 20

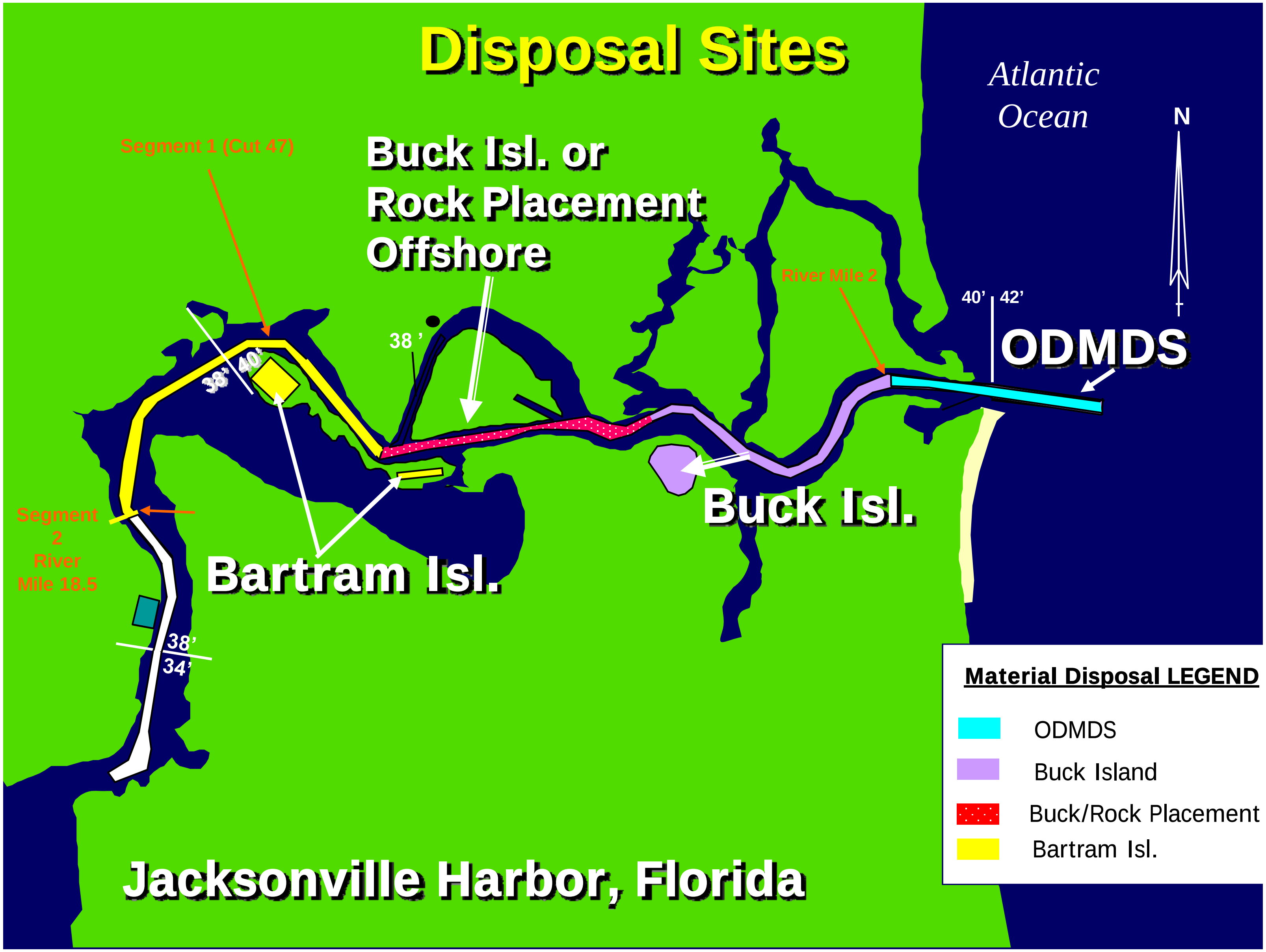
Plan A Reaches 1-5 (e)			
E. Channel Bar Cut-3 Sta. 0+00 through	Dredging	Dredging	Dredging
Terminal Channel Station 184+42.8	Uncl.	Rock	Total
Project Depth (2' Req. OD + 2' OD)	Vol/Cyds	Vol/Cyds	Vol/Cyds
41	**1,627,424**	**4,819,576**	**6,447,000**
42	2,709,219	6,998,032	9,707,250
43	3,791,013	9,176,487	12,967,500
44	4,872,808	11,354,943	16,227,750
45	**5,954,602**	**13,533,398**	**19,488,000**
46	7,225,386	16,001,014	23,226,400
47	8,496,170	18,468,630	26,964,800
48	9,766,955	20,936,245	30,703,200
49	11,037,739	23,403,861	34,441,600
50	**12,308,523**	**25,871,477**	**38,180,000**

Shoaling Quantities

CHANNEL REACH	ANNUAL SHOALING RATE	DREDGING FREQUENCY	QUANTITY
BARCUT 3 - CUT 13	175,000	3 YEARS	525,000 CY
CUT 14 - CUT 41	80,000	3 YEARS	240,000 CY
CUT 42	330,000	2 YEARS	660,000 CY
CUT 43 - Terminal Channel*	142,000	3 YEARS	426,000 CY
BLOUNT ISLAND - CUTS F&G**	100,000	2 YEARS	200,000 CY
SPONSOR MATERIAL	150,000	1 YEARS	150,000 CY
Totals	977,000		

* Current estimated quantity is 85,000 cy. Additional quantity of 57,000 cy estimated as a result of Phase III construction.

** Cuts F&G are scheduled to be dredged in late 2004 to remove approximately 121,000 cy. Also, JAXPORT (Frank Jones) said that the adjacent berths have experienced a shoaling rate of about 40,000 cy. annually. For purposes of the DMMP, assume annual shoaling of 100,000 cy. and a 2 year frequency.



Disposal Sites
Atlantic Ocean
N
Segment 1 (Cut 47)
Buck Isl. or Rock Placement Offshore
River Mile 2
40' 42'
ODMDS
38'
38' 40'
Segment 2 River Mile 18.5
Bartram Isl.
Buck Isl.
38'
34'
Material Disposal LEGEND
ODMDS
Buck Island
Buck/Rock Placement
Bartram Isl.
Jacksonville Harbor, Florida

Navigation Benefits

- Transportation Cost Savings
  - Tidal delays due to insufficient channel depth
  - Light loading due to insufficient channel depth
  - Economies of Scale with existing smaller fleet shifting to larger ships.
- Results of USACE and EPA July 2009 meeting;
  - Task 1: Evaluate new construction benefit cost analysis for ODMDS disposal options at 5, 10, and 15 miles offshore.
  - Task 2: Consider existing maintenance placement in addition to offshore options at 5, 10, and 15 miles offshore.

Task 1 Results: New Construction Benefit/Cost Ratios

	Total New Construction Costs [1,4]	AAEQ Cost[2]	AAEQ Benefits [3]	BCR
5mile	$348,453,330	$18,719,708	$ 21,897,161	1.17
10mile	$379,756,127	$20,401,366	$ 21,897,161	1.07
15 mile	$415,934,143	$22,344,931	$ 21,897,161	0.98

Notes

1. New Construction Preliminary Total Costs for Segments 1&2 at a 43' Project Depth plus Interest During Construction (IDC)
2. FY07 Cost Levels
3. Benefits listed for Segment 1 &2, in FY07 Cost levels.
4. IDC (FY07 cost levels) equivalent for portion of material (Segments 1&2) going to ODMDS.

	IDC[4]
5 mi	$9,138,168.60
10 mi	$22,845,421.50
15 mi	$57,113,553.75

Task 2 Results: New Construction + O&M Benefit/Cost Ratios

Average Annual Equivalent Valuations:
4.875% -----> $ 33,133,282

Total Present Valuation(s), Excluding Base Period:
4.875% -----> $ 616,751,197

Average Annual Equivalent Valuations:
4.875% -----> $ 33,982,600

Total Present Valuation(s), Excluding Base Period:
4.875% -----> $ 632,560,611

Average Annual Equivalent Valuations:
4.875% -----> $ 34,174,396

Total Present Valuation(s), Excluding Base Period:
4.875% -----> $ 636,130,765

	ODMDS Placement 5 Miles		ODMDS Placement 10 Miles		ODMDS Placement 15 Miles	
Year	Stream Values [1]	4.875%	Stream Values	4.875%	Stream Values	4.875%
2009		$ -		$ -		$ -
2010	$ 2,105,500	$ 2,007,628	$ 2,105,500	$ 2,007,628	$ 2,105,500	$ 2,007,628
2011		$ -		$ -		$ -
2012		$ -		$ -		$ -
2013	$ 4,105,500	$ 3,393,737	$ 4,105,500	$ 3,393,737	$ 4,105,500	$ 3,393,737
2014	**$ 335,618,732**	$ 264,536,938	**$ 344,544,889**	$ 271,572,596	**$ 346,560,635**	$ 273,161,420
2015		$ -		$ -		$ -
2016		$ -		$ -		$ -
2017	$ 4,105,500	$ 2,805,371	$ 4,105,500	$ 2,805,371	$ 4,105,500	$ 2,805,371
2018		$ -		$ -		$ -
2019		$ -		$ -		$ -
2020	$ 4,105,500	$ 2,432,060	$ 4,105,500	$ 2,432,060	$ 4,105,500	$ 2,432,060
2021		$ -		$ -		$ -
2022		$ -		$ -		$ -
2023	$ 4,105,500	$ 2,108,426	$ 4,105,500	$ 2,108,426	$ 4,105,500	$ 2,108,426
2024	**$ 335,618,732**	$ 164,348,818	**$ 344,544,889**	$ 168,719,859	**$ 346,560,635**	$ 169,706,948
2025		$ -		$ -		$ -
2026		$ -		$ -		$ -

Task 3 Results: O&M Benefit/Cost Ratios

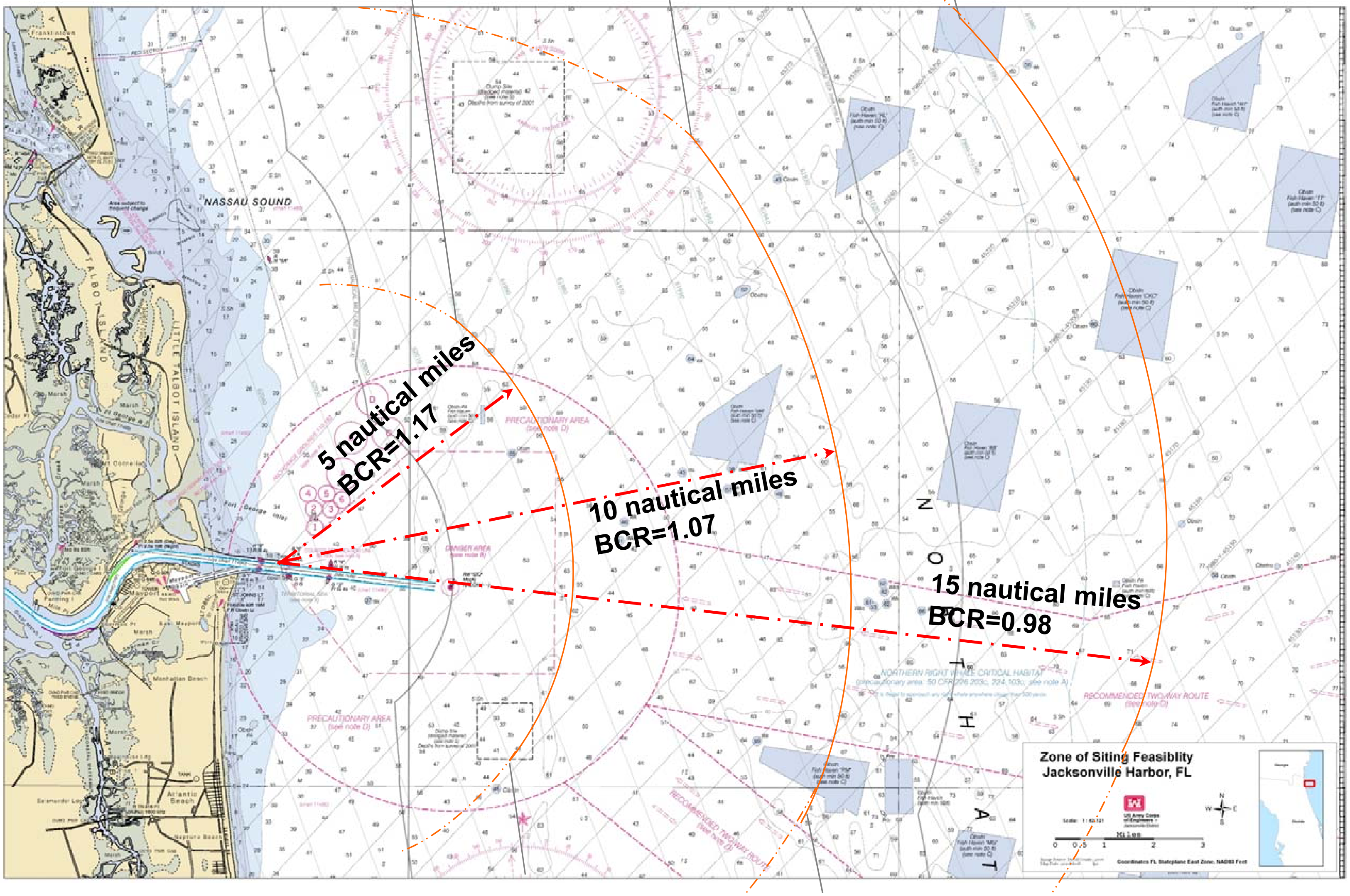
	Quantities 38-40[1]	Total Cost	AAEQ Cost[2]	AAEQ Cost[3]	AAEQ Benefits[4]	BCR
5 Miles	380,778.67	$24,528,484	1,266,523	$835,390	$851,000	**1.02**
10 Miles	380,778.67	$25,949,544	1,339,899	$883,788	$851,000	**0.96**
15 Miles	380,778.67	$27,302,254	1,409,746	$929,859	$851,000	**0.92**

Notes

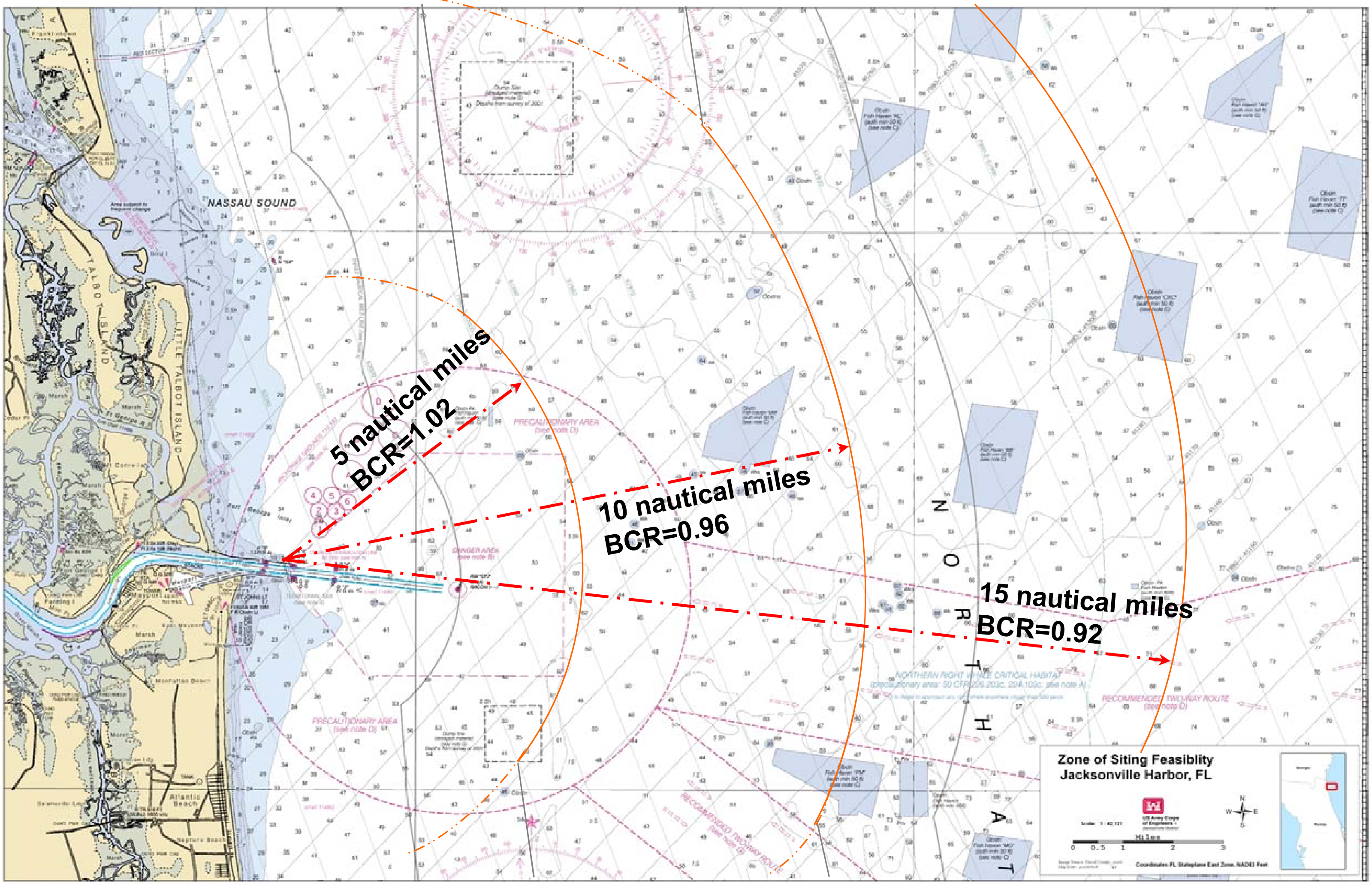
1. *Quantities were taken from the 2002 Jacksonville Harbor GRR for 2 feet of dredged material, segment 3A2.*
2. *Costs were derived in 2009 for 5, 10, 15 ODMDS locations. Quantities from the 2002 report were matched with the 2009 costs. 380,778.67 Cubic Yards of Material is equivalent to 2/3 of the quantities assumed in the 2009 estimates, thus the total 2009 equivalent costs are shown in AAEQ Costs[3].*
3. *Costs were deflated to 2002 to match the 2002 benefits.*
4. *Benefits were taken from the 2002 report.*

Zone of Siting Feasibility

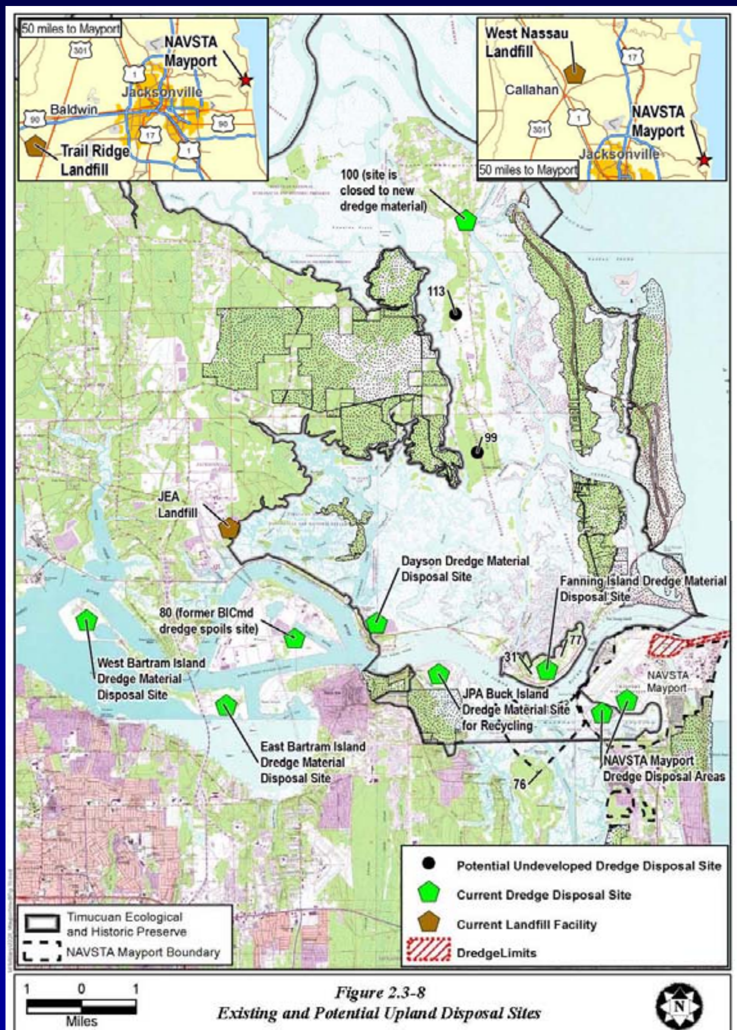
Preliminary New Construction Benefit and Cost Ratios



Zone of Siting Feasibility
Operation and Maintenance (O&M) Benefit and Cost Ratios



Navy Disposal Options



- Site 99 & 113: undeveloped land within Timucuan Ecological and Historic preserve.

Jax Harbor Disposal Options

JACKSONVILLE HARBOR DISPOSAL CONSIDERATIONS